

JAPANESE [JP,10-023071,A]

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CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE  
INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS  
CORRECTION OR AMENDMENT

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**CLAIMS**

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[Claim(s)]

[Claim 1] In the migration communication system with which a migration host moves between networks, being accompanied by modification of the address, and a communication link is continuously performed before and after migration when said migration host cannot communicate. When a junction are recording means to accumulate the communication link information addressed to said migration host, and a communication link of said migration host are good. A junction transfer means to perform a junction transfer of said communication link information with said migration host. The junction control means which performs control with said junction are recording means and said junction transfer means based on said migration host's communication link propriety information, since -- with the communication link information repeating installation constituted and an are recording means to accumulate said communication link information addressed to said migration host. A communications control means to give said migration host control with said are recording means and said transfer means based on a transfer means to transmit said communication link information, and said communication link information repeating installation's existence information and the communication message from said migration host, since -- the migration communication system characterized by having communication link information transfer equipment constituted.

[Claim 2] the flag which shows whether said communications control means transmits said communication link information to the address the address and temporarily [ said ] temporarily which shows the location on said network which said migration host has, and the item which shows the existence of the existence of said communication link information repeating installation -- since -- the migration communication system according to claim 1 characterized by including the communication management table constituted.

[Claim 3] said junction control means passes said communication link information to said communication link information repeating installation with the address and the home address of said communication link information-transfer equipment temporarily which shows the location on said network which said migration host has, or is stored up -- the item which shows that either -- since -- the migration communication system according to claim 1 characterized by to include the junction managed table constituted.

[Claim 4] It is the migration communication system according to claim 1 with which said transfer means is characterized by transmitting the notice of cutting propriety to said migration host as said communication link information when said migration host is cut from said network.

[Claim 5] It is the migration communication system according to claim 1 with which said transfer means is characterized by transmitting the notice of a junction suspend request to said communication link information repeating installation as said communication link information when said migration host is cut from said network.

[Claim 6] It is the migration communication system according to claim 1 with which said junction transfer means is characterized by transmitting the notice of cutting propriety to said migration host as said communication link information when said migration host is cut from said network.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the migration communication system with which the migration host who moves between networks while being accompanied by modification of the address communicates continuously before and after migration about migration communication system.

[0002]

[Description of the Prior Art] By the miniaturization of a computer in recent years, and the spread of computer networks, the host connected to the network is temporarily separated from a network, and is carried, and the communication system again connected to a network at a migration place is used.

[0003] A network is constituted when more than one interconnect the subnet which shares the same network address, and the address according to the subnet to connect is assigned to the host on a network.

[0004] Then, the address is assigned the home address used as a migration host's identifier to the migration host who moves with modification of the address in a network top, and temporarily which shows the location on a network. Although it does not change with migration of a host since the home address is used for discernment of a host, the address changes temporarily according to the subnet which the host connected.

[0005] Moreover, since the program on other hosts who are a communications program on a migration host and its communications partner identifies a migration host using the home address at the time of the communication link, it can communicate continuously before and after migration of a host.

[0006] Furthermore, the packet transfer equipment for managing correspondence of the address by one on a network of hosts the home address and temporarily is arranged on a network. Thereby, the packet addressed to the home address is transmitted to the address temporarily, and is sent into the target host.

[0007] Thus, when a host moves, a change of the address is made automatically, but the packet addressed to the address which already flowed on the network will be canceled temporarily, by the time modification of the address is completed. Therefore, it is necessary to accumulate the packet addressed to a migration host until the migration host who is the destination of a packet becomes receivable.

[0008] As what accumulates a packet, there is JP,5-83260,A, packet transfer equipment is equipped with a packet are recording means, and the packet addressed to a migration host is accumulated until a migration host becomes receivable.

[0009] Drawing 16 is drawing showing the configuration of the above-mentioned conventional technique. three -- a \*\* -- a subnet -- Net -- ten - 12 -- from -- becoming -- a network -- migration -- a host -- (-- MH --) -- 300 -- a packet -- a transfer -- equipment -- (-- HR --) -- 100 -- a router -- Rb -- Re -- since -- it is constituted. The migration host (MH) 300 has the address temporarily showing the home address showing an identifier, and a physical location. The home address is used for other hosts identifying the migration host (MH) 300 on the same

network, and belongs to Net10.

[0010] Packet transfer equipment (HR) 100 exists on Net10, manages correspondence of the address the migration host's (MH)'s 300 home address, and temporarily, and transmits the packet addressed to the migration host's (MH)'s 300 home address to current addressing to the momentary address.

[0011] Router Rb and Router Re connect a different subnet, and relay the packet between subnets. First, suppose that the migration host (MH) 300 is cut from Net11. In this case, the packets 101a-101n addressed to migration host (MH) 300 are accumulated in the packet are recording section 101 belonging to packet transfer equipment (HR) 100.

[0012] Drawing 17 is drawing showing signs that a packet is transmitted to a migration host. The migration host (MH) 300 is cut from Net11, and is connected to Net12. After connection, the packets 101a-101n which were being accumulated in the packet are recording section 101 are relayed by Router Re and Router Rb, and are transmitted to the migration host (MH) 300, and the usual packet communication is performed after that.

[0013]

[Problem(s) to be Solved by the Invention] However, in the above conventional techniques, when a migration host will be in migration, then the said condition which cannot be communicated to other networks, a packet will be accumulated with packet transfer equipment irrespective of a migration host's location. For this reason, even when the communication link of a migration host was attained, by the time the accumulated packet reached the migration host according to the communication range between packet transfer equipment and a migration host, delay occurred, and the migration host had the trouble of being kept waiting considerable time, while receiving the packet.

[0014] This invention is made in view of such a point, and it aims at offering the migration communication system which suppresses short the time delay of the packet communication accompanying migration between networks.

[0015]

[Means for Solving the Problem] In the migration communication system with which a migration host moves between networks, being accompanied by modification of the address, and a communication link is continuously performed before and after migration in order to solve the above-mentioned technical problem When a junction are recording means to accumulate the communication link information addressed to said migration host when said migration host cannot communicate, and a communication link of said migration host are good A junction transfer means to perform a junction transfer of said communication link information with said migration host, The junction control means which performs control with said junction are recording means and said junction transfer means based on said migration host's communication link propriety information, since -- with the communication link information repeating installation constituted and an are recording means to accumulate said communication link information addressed to said migration host A communications control means to give said migration host control with said are recording means and said transfer means based on a transfer means to transmit said communication link information, and said communication link information repeating installation's existence information and the communication message from said migration host, since -- the migration communication system characterized by having communication link information transfer equipment constituted is offered.

[0016] Here, if a migration host cuts the migration place address from a network after a notice to communication link information transfer equipment, communication link information transfer equipment will change the destination of the communication link information addressed to a migration host to the migration place address. And the junction are recording means which the communication link information repeating installation of a migration place network has accumulates the communication link information addressed to a migration host. After migration, if it can connect with a new network and can communicate, a junction transfer means will transmit communication link information to a migration host. A junction control means performs control with a junction are recording means and a junction transfer means based on a migration host's communication link propriety information.

[0017] Moreover, when a migration host cuts from a network and communication link information repeating installation does not exist in the network of a migration place, the are recording means which communication link information transfer equipment has accumulates communication link information. And a transfer means transmits direct communication information to a migration host. Or when communication link information repeating installation exists in the network of a migration place, the communication link information from a transfer means is transmitted to a migration host via communication link information repeating installation, without accumulating communication link information with an are recording means. A communications control means performs control with an are recording means and a transfer means based on communication link information repeating installation's existence information and a communication message including the address from a migration host etc.

[0018]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained based on a drawing. Drawing 1 is the principle Fig. of the migration communication system of this invention. the communication link information transfer equipment 1 with which migration communication system transmits communication link information, the communication link information repeating installation 2 which relays the communication link information between networks, and the home address and the migration host 3 which has the address temporarily -- since -- it is constituted. a communications control means 11 by which communication link information transfer equipment 1 performs communications control of communication link information, an are recording means 12 to accumulate communication link information, and a transfer means 13 to transmit communication link information to the migration host 3 -- since -- it is constituted.

[0019] the junction control means 21 to which the communication link information repeating installation 2 carries out junction control of communication link information, a junction are recording means 22 to accumulate the communication link information to which it was sent from communication link information transfer equipment 1, and a junction transfer means 23 to perform a junction transfer with the migration host 3 -- since -- it is constituted.

[0020] Next, actuation of the migration communication system of this invention is explained.

First, the migration host 3 presupposes that it is cut from the network which is making current connection. The migration host 3 transmits the migration place address and a communication link information suspend request to the communications control means 11 as a communication message.

[0021] If the communication link information repeating installation 2 does not exist in a moved material network, the transfer means 13 notifies the migration host 3 of the notice which can be cut. If the communication link information repeating installation 2 exists in a moved material network, the transfer means 13 will perform the junction suspend request of communication link information to the communication link information repeating installation 2. And the junction transfer means 23 of the communication link information repeating installation 2 notifies the migration host 3 of the notice which can be cut.

[0022] Moreover, when the communication link information repeating installation 2 does not exist in the migration host's 3 migration place network, the are recording means 12 accumulates the communication link information addressed to migration host 3. When the communication link information repeating installation 2 exists in the migration host's 3 migration place network, the junction are recording means 22 accumulates the communication link information addressed to migration host 3.

[0023] Next, suppose that the migration host 3 is connected to a migration place network. After the migration host's 3 connecting, if a communication link becomes possible, the resumption demand of a transfer will be notified as communication link propriety information. The migration host 3 notifies the resumption demand of a transfer to communication link information transfer equipment 1 irrespective of the existence of the existence of the communication link information repeating installation 2. When the communication link information repeating installation 2 exists on the path of the migration host 3 and communication link information transfer equipment 1, the communication link information from the migration host 3 surely goes via the communication link

information repeating installation 2.

[0024] After the notice of resumption of a transfer, when the communication link information repeating installation 2 does not exist in a migration place network, the communication link information accumulated with the are recording means 12 of communication link information transfer equipment 1 is transmitted to the migration host 3, and an after that usual communication link resumes. When the communication link information repeating installation 2 exists in a migration place network, communication link information is transmitted to the migration host 3 from the junction are recording means 22 of the communication link information repeating installation 2, and an after that usual communication link resumes.

[0025] Next, it explains in detail that processing actuation of the migration communication system of this invention flows. Here, since communication link information is packet-ized, communication link information is explained as a packet henceforth. Drawing 2 is drawing showing the flow of processing actuation of migration communication system. migration -- communication system -- four -- a \*\* -- a subnet -- Net -- zero - three -- from -- becoming -- a network -- a packet -- transmitting -- a packet -- a transfer -- equipment -- (-- HR --) -- one -- a packet -- acting as intermediary -- a packet -- repeating installation -- (-- MR --) -- two -- a -- 2b -- a router -- (-- Ra --) -- four -- migration -- a host -- (-- MH --) -- three -- since -- it is constituted.

[0026] The migration host (MH) 3 has home address addr\_h showing an identifier, and when having connected with Net1 and the address addr1 is connected to Net2 temporarily, when the address addr2 is connected to Net3, he has the address addr3 temporarily. Moreover, home address addr\_h belongs to Net0.

[0027] Packet transfer equipment (HR) 1 exists on Net0, manages correspondence with the address the migration host's (MH)'s 3 home address, and temporarily, and transmits the packet addressed to the migration host's (MH)'s 3 home address in the migration host's (MH)'s 3 current momentary address.

[0028] Packet repeating-installation (MR) 2a and (MR) 2b relays the packet between subnets. Packet repeating-installation (MR)2a is located at the node of Net0 and Net1, and packet repeating-installation (MR) 2b is located at the node of Net0 and Net2. Packet repeating-installation (MR) 2a and (MR) 2b has a function as a router, and the function which accumulates a packet.

[0029] A router (Ra) 4 is a router which is located at the node of Net0 and Net3, and relays a packet. drawing -- \*\*\*\* -- a packet -- repeating installation -- (-- MR --) -- two -- a -- minding -- a packet -- a transfer -- equipment -- (-- HR --) -- one -- from -- migration -- a host -- (-- MH --) -- three -- a packet -- transmitting -- having -- \*\*\*\* -- a situation -- being shown -- \*\*\*\*. That is, packet transfer equipment (HR) 1 has transmitted the packet addressed to the migration host's (MH)'s 3 home address addr\_h to the momentary address addr1 of the migration host's (MH)'s 3 Net1.

[0030] Drawing 3 is drawing showing a communication management table and a junction managed table. The table value in case the migration host (MH) 3 is connected to Net1 is shown. (A) is a communication management table in the communications control means of packet transfer equipment (HR) 1, and (B) and (C) are the junction managed tables in packet repeating-installation (MR)2a and the junction control means of 2b, respectively.

[0031] the table on which the communication management table of (A) supports home address addr\_h -- it is -- "the momentary address", and the migration host's (MH)'s 3 "flag" and "the existence of MR" -- since -- it is constituted. "The momentary address" is set up with addr 1-3, respectively as the momentary address in case a migration host (MH) connects with Net 1-3.

[0032] It is shown temporarily [ which ] a "flag" transmits a packet to the address, and a flag transmits the packet addressed to the home address to addressing to the momentary address of UP. Moreover, there is no address temporarily which is UP to the home address, and when it is DOWN altogether, packet transfer equipment (HR) accumulates the packet addressed to the home address with an are recording means.

[0033] If packet repeating installation (MR) exists in a subnet, it True(s) and "existence of MR" does not exist, it serves as False. Therefore, with the configuration of drawing 2, since the

migration host (MH) 3 has connected with the "momentary address" addr 1, a "flag" serves as UP. And since packet repeating-installation (MR)2a exists in the trunk connection point, "existence of MR" serves as True. Moreover, since the migration host (MH) has not connected with the "momentary address" addr 2, a "flag" serves as DOWN. And since packet repeating installation (MR) exists in the trunk connection point, "existence of MR" serves as True. Furthermore, since the migration host (MH) has not connected with the "momentary address" addr 3, a "flag" serves as DOWN. And since packet repeating installation (MR) does not exist in the trunk connection point, "existence of MR" serves as False.

[0034] the junction managed table of (B) and (C) -- a migration host's (MH)'s "the momentary address" and "HR address", and a "flag" -- since -- it is constituted. When passing the packet of the communication link performed between a migration host's (MH)'s momentary address, and the packet transfer (equipment HR) address with packet repeating installation (MR), a flag serves as UP. When accumulating with the junction are recording means of packet repeating installation (MR), a flag serves as DOWN.

[0035] Therefore, with the configuration of drawing 2, since the packet is relayed to the "momentary address" addr 1 between "HR address" addr\_HR, a flag serves as UP. Moreover, between "HR address" addr\_HR, the packet is not relayed to the "momentary address" addr 2. For this reason, a flag is set to DOWN and it is set as the mode which accumulates a packet.

[0036] Next, a host is cut from a subnet and the case where it moves to other subnets is explained in detail using drawing 4 - drawing 6. Drawing 4 is drawing in case the migration host (MH) 3 cuts from Net1 and moves to Net2. This shows the situation of migration in case packet repeating installation (MR) exists in both migration places Net2 the moved material Net1. Since the configuration of migration communication system is the same as that of drawing 2, explanation of a configuration is omitted.

[0037] Drawing 5 is a flow chart which shows procedure in case a migration host (MH) cuts from Net1 and moves to Net2.

[S1] The migration host (MH) 3 interrupts the packet transmission from self, and transmits the notice of the migration place address addr2, and the suspend request of a packet transfer to the communications control means of packet transfer equipment (HR) 1.

[S2] The communications control means of packet transfer equipment (HR) 1 changes the flag of addr1 of an own communication management table into DOWN, and if it checks that packet repeating-installation (MR) 2b is in Net2 of addr2, it will change the flag of addr2 into UP.

[S3] The communications control means of packet transfer equipment (HR) 1 checks whether packet repeating installation (MR) exists in Net1 which is addr1 from a communication management table. When packet repeating installation (MR) does not exist on Net1, it goes to step S4, and when packet repeating installation (MR) exists on Net1, it goes to step S5. Here, since packet repeating-installation (MR)2a exists on Net1 of addr1, it goes to step S5.

[S4] The communications control means of packet transfer equipment (HR) 1 notifies the migration host (MH) 3 of cutting with Net1 being possible.

[S5] The communications control means of packet transfer equipment (HR) 1 requires interruption of packet junction of the junction control means of packet repeating-installation (MR)2a.

[ -- S -- six -- ] -- a packet -- repeating installation -- ( -- MR -- ) -- two -- a -- junction -- a control means -- a suspend request -- winning popularity -- if -- junction -- management -- a table -- addr -- one -- a flag -- DOWN -- having carried out -- after -- migration -- a host -- ( -- MH -- ) -- three -- Net -- one -- cutting -- being possible -- things -- notifying .

[S7] The transfer means of packet transfer equipment (HR) 1 transmits the packet addressed to the migration host's (MH)'s 3 home address addr\_h to the address addr2 temporarily.

[S8] Since the flag of addr2 of a junction managed table is DOWN, packet repeating-installation (MR) 2b accumulates the addressing packets 10a-10n to addr2 sent from packet transfer equipment (HR) 1 in junction are recording means 22b.

[0038] Drawing 6 is drawing showing a communication management table and a junction managed table until a migration host (MH) is cut from Net1 and moves to Net2. (A) is a communication management table in the communications control means of packet transfer equipment (HR) 1,



and (B) and (C) are the junction managed tables in packet repeating-installation (MR) 2a and the junction control means of 2b. About a table value, since it mentioned above, explanation is omitted.

[0039] Next, resumption of junction is explained in detail using drawing 7 - drawing 9. Drawing 7 is drawing which transmits the packet which packet repeating installation (MR) accumulated to a migration host (MH), and resumes junction. It connects with Net2 and the migration host (MH) 3 will be in the condition which can communicate. Then, the packets 10a-10n accumulated in junction are recording means 22b of packet repeating-installation (MR) 2b are transmitted to the migration host (MH) 3, and junction resumes. Then, packet communication is performed between packet transfer equipment (HR) 1 and the migration host (MH) 3. Since the configuration of migration communication system is the same as that of drawing 2, explanation of a configuration is omitted.

[0040] Drawing 8 is a flow chart which shows procedure in case the migration host (MH) 3 moves to Net2 and junction resumes.

[S10] If the migration host (MH) 3 connects with Net2 in the address addr2 temporarily, he will transmit a transfer request to the communications control means of packet transfer equipment (HR) 1.

[S11] Packet repeating-installation (MR) 2b detects the transfer request sent from addr2, and transmits the packets 10a-10n addressed to addr2 accumulated in own are recording means 22b to the migration host (MH) 3.

[S12] Packet repeating-installation (MR) 2b changes the flag of addr2 into UP, and resumes the junction of Net2 of the packet addressed to addr2. Packet transfer equipment (HR) 1 will change the flag of addr2 of a communications control table into UP, if a transfer request is received from the migration host (MH) 3. Here, it is already UP.

[S13] Packet communication resumes between packet transfer equipment (HR) 1 and the migration host (MH) 3 through packet repeating-installation (MR) 2b.

[0041] Drawing 9 is drawing showing a communication management table and a junction managed table in case junction resumes. (A) is a communication management table in the communications control means of packet transfer equipment (HR) 1, and (B) and (C) are the junction managed tables in packet repeating-installation (MR) 2a and the junction control means of 2b. About a table value, since it mentioned above, explanation is omitted.

[0042] Next, the case where the migration host (MH) 3 moves to Net3 from Net2 is explained in detail using drawing 10 - drawing 12. Drawing 10 is drawing showing the case where the migration host (MH) 3 moves to Net3 from Net2. This shows the situation of migration in case packet repeating installation (MR) does not exist in the migration place Net3. Since the configuration of migration communication system is the same as that of drawing 2, explanation of a configuration is omitted.

[0043] Drawing 11 is a flow chart in case the migration host (MH) 3 moves to Net3 from Net2.

[S20] The migration host (MH) 3 interrupts the packet transmission from self, and transmits the notice of the address addr3, and the suspend request of a packet transfer to the notice control means of packet transfer equipment (HR) 1 temporarily [ migration place ].

[S21] The communications control means of packet transfer equipment (HR) 1 changes the flag of addr2 of an own communications control managed table into DOWN, it checks that packet repeating installation (MR) does not exist in Net3 of addr3, and the flag of addr3 is not changed with DOWN.

[S22] The communications control means of packet transfer equipment (HR) 1 checks whether packet repeating installation (MR) exists in Net2 which is addr2 of a moved material from a communications control table. When packet repeating installation (MR) does not exist on Net2, it goes to step S23, and when packet repeating installation (MR) exists on Net2, it goes to step S24. Here, since packet repeating-installation (MR) 2b exists on Net2 of addr2, it goes to step S24.

[S23] The communications control means of packet transfer equipment (HR) 1 notifies the migration host (MH) 3 of cutting with Net2 being possible.

[S24] The communications control means of packet transfer equipment (HR) 1 requires

interruption of packet junction of the junction control means of packet repeating-installation (MR) 2b.

[S25] The junction control means of packet repeating-installation (MR) 2b will set the flag of addr2 of a junction managed table to DOWN, if a suspend request is received, and it notifies the migration host (MH) 3 of cutting with Net2 being possible. Here, it is already DOWN.

[S26] Since the flag of addr3 of a communication management table is DOWN, packet transfer equipment (HR) 1 accumulates the addressing packet to addr3 in the are recording means 12.

[0044] Drawing 12 is drawing showing the communication management table and junction managed table at the time of the migration host (MH) 3 moving to Net3 from Net2. (A) is a communication management table in the communications control means of packet transfer equipment (HR) 1, and (B) and (C) are the junction managed tables in packet repeating-installation (MR)2a and the junction control means of 2b. About a table value, since it mentioned above, explanation is omitted.

[0045] Drawing 13 is drawing where the packet which packet repeating installation (MR) accumulated is transmitted to a migration host (MH), and junction is resumed. It connects with Net3 and the migration host (MH) 3 will be in the condition which can communicate. Then, the packets 10a-10n accumulated in the are recording means 12 of packet transfer equipment (HR) 1 are transmitted to the migration host (MH) 3 through a router (Ra) 4. After that, the usual packet communication is performed.

[0046] Next, the network example in which the migration communication system of this invention is applied is explained in detail. Drawing 14 is drawing in case a migration host moves between a wireless host's subnets. Two base transceiver stations r1 and r2 which exist in Net4 form the cel of wireless subnets net1 and net2 different, respectively. When wireless (host MH) 3a moves to the cel of a base transceiver station r2 from the cel of a base transceiver station r1, it will move between wireless subnets which are different from the wireless subnet net1 to the wireless subnet net2. In such a case, if a communication relay group is arranged between the wireless subnet net1 and the wireless subnet net2, it is possible to realize migration communication system of this invention.

[0047] Drawing 15 is drawing in case a wireless host moves between a cable subnet and the wireless subnet which interconnected. Although the cel which each forms since base transceiver stations r3 and r4 function as a repeater is the same subnet as the cable network of a connection place, a subnet Net5 and a subnet Net6 are made by the routers Rc and Rd linked to a network Net0. Therefore, the subnet of the cel which base stations r3 and r4 form is set to Net5 and Net6, respectively. Therefore, when wireless (host MH) 3a moves to the cel of a base station r4 from the cel of a base station r3, a subnet which is different from a subnet Net5 to a subnet Net6 will be moved. In such a case, it is possible by arranging repeating installation between Net4 and Net5 or to either between Net4 and Net6 to realize migration communication system of this invention.

[0048]

[Effect of the Invention] As explained above, migration communication system of this invention was considered as the configuration which communicates by arranging packet repeating installation between packet transfer equipment and a migration host. Thereby, even if the communication range between packet transfer equipment and a migration host is long, delay of a packet transfer can be decreased and the time of delivery of a packet when a migration host connects on a new network is shortened.

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**TECHNICAL FIELD**

[Field of the Invention] Especially this invention relates to the migration communication system with which the migration host who moves between networks while being accompanied by modification of the address communicates continuously before and after migration about migration communication system.

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## PRIOR ART

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[Description of the Prior Art] By the miniaturization of a computer in recent years, and the spread of computer networks, the host connected to the network is temporarily separated from a network, and is carried, and the communication system again connected to a network at a migration place is used.

[0003] A network is constituted when more than one interconnect the subnet which shares the same network address, and the address according to the subnet to connect is assigned to the host on a network.

[0004] Then, the address is assigned the home address used as a migration host's identifier to the migration host who moves with modification of the address in a network top, and temporarily which shows the location on a network. Although it does not change with migration of a host since the home address is used for discernment of a host, the address changes temporarily according to the subnet which the host connected.

[0005] Moreover, since the program on other hosts who are a communications program on a migration host and its communications partner identifies a migration host using the home address at the time of the communication link, it can communicate continuously before and after migration of a host.

[0006] Furthermore, the packet transfer equipment for managing correspondence of the address by one on a network of hosts the home address and temporarily is arranged on a network. Thereby, the packet addressed to the home address is transmitted to the address temporarily, and is sent into the target host.

[0007] Thus, when a host moves, a change of the address is made automatically, but the packet addressed to the address which already flowed on the network will be canceled temporarily, by the time modification of the address is completed. Therefore, it is necessary to accumulate the packet addressed to a migration host until the migration host who is the destination of a packet becomes receivable.

[0008] As what accumulates a packet, there is JP,5-83260,A, packet transfer equipment is equipped with a packet are recording means, and the packet addressed to a migration host is accumulated until a migration host becomes receivable.

[0009] Drawing 16 is drawing showing the configuration of the above-mentioned conventional technique. three -- a \*\* -- a subnet -- Net -- ten - 12 -- from -- becoming -- a network -- migration -- a host -- (--- MH ---) -- 300 -- a packet -- a transfer -- equipment -- (--- HR ---) -- 100 -- a router -- Rb -- Re -- since -- it is constituted. The migration host (MH) 300 has the address temporarily showing the home address showing an identifier, and a physical location. The home address is used for other hosts identifying the migration host (MH) 300 on the same network, and belongs to Net10.

[0010] Packet transfer equipment (HR) 100 exists on Net10, manages correspondence of the address the migration host's (MH)'s 300 home address, and temporarily, and transmits the packet addressed to the migration host's (MH)'s 300 home address to current addressing to the momentary address.

[0011] Router Rb and Router Re connect a different subnet, and relay the packet between subnets. First, suppose that the migration host (MH) 300 is cut from Net11. In this case, the

packets 101a-101n addressed to migration host (MH) 300 are accumulated in the packet are recording section 101 belonging to packet transfer equipment (HR) 100.

[0012] Drawing 17 is drawing showing signs that a packet is transmitted to a migration host. The migration host (MH) 300 is cut from Net11, and is connected to Net12. After connection, the packets 101a-101n which were being accumulated in the packet are recording section 101 are relayed by Router Re and Router Rb, and are transmitted to the migration host (MH) 300, and the usual packet communication is performed after that.

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] As explained above, migration communication system of this invention was considered as the configuration which communicates by arranging packet repeating installation between packet transfer equipment and a migration host. Thereby, even if the communication range between packet transfer equipment and a migration host is long, delay of a packet transfer can be decreased and the time of delivery of a packet when a migration host connects on a new network is shortened.

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[Translation done.]

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] However, in the above conventional techniques, when a migration host will be in migration, then the said condition which cannot be communicated to other networks, a packet will be accumulated with packet transfer equipment irrespective of a migration host's location. For this reason, even when the communication link of a migration host was attained, by the time the accumulated packet reached the migration host according to the communication range between packet transfer equipment and a migration host, delay occurred, and the migration host had the trouble of being kept waiting considerable time, while receiving the packet.

[0014] This invention is made in view of such a point, and it aims at offering the migration communication system which suppresses short the time delay of the packet communication accompanying migration between networks.

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## MEANS

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[Means for Solving the Problem] In the migration communication system with which a migration host moves between networks, being accompanied by modification of the address, and a communication link is continuously performed before and after migration in order to solve the above-mentioned technical problem When a junction are recording means to accumulate the communication link information addressed to said migration host when said migration host cannot communicate, and a communication link of said migration host are good A junction transfer means to perform a junction transfer of said communication link information with said migration host, The junction control means which performs control with said junction are recording means and said junction transfer means based on said migration host's communication link propriety information, since — with the communication link information repeating installation constituted and an are recording means to accumulate said communication link information addressed to said migration host A communications control means to give said migration host control with said are recording means and said transfer means based on a transfer means to transmit said communication link information, and said communication link information repeating installation's existence information and the communication message from said migration host, since — the migration communication system characterized by having communication link information transfer equipment constituted is offered.

[0016] Here, if a migration host cuts the migration place address from a network after a notice to communication link information transfer equipment, communication link information transfer equipment will change the destination of the communication link information addressed to a migration host to the migration place address. And the junction are recording means which the communication link information repeating installation of a migration place network has accumulates the communication link information addressed to a migration host. After migration, if it can connect with a new network and can communicate, a junction transfer means will transmit communication link information to a migration host. A junction control means performs control with a junction are recording means and a junction transfer means based on a migration host's communication link propriety information.

[0017] Moreover, when a migration host cuts from a network and communication link information repeating installation does not exist in the network of a migration place, the are recording means which communication link information transfer equipment has accumulates communication link information. And a transfer means transmits direct communication information to a migration host. Or when communication link information repeating installation exists in the network of a migration place, the communication link information from a transfer means is transmitted to a migration host via communication link information repeating installation, without accumulating communication link information with an are recording means. A communications control means performs control with an are recording means and a transfer means based on communication link information repeating installation's existence information and a communication message including the address from a migration host etc.

[0018]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained based on a drawing. Drawing 1 is the principle Fig. of the migration communication system of this



invention, the communication link information transfer equipment 1 with which migration communication system transmits communication link information, the communication link information repeating installation 2 which relays the communication link information between networks, and the home address and the migration host 3 which has the address temporarily -- since -- it is constituted. a communications control means 11 by which communication link information transfer equipment 1 performs communications control of communication link information, an are recording means 12 to accumulate communication link information, and a transfer means 13 to transmit communication link information to the migration host 3 -- since -- it is constituted.

[0019] the junction control means 21 to which the communication link information repeating installation 2 carries out junction control of communication link information, a junction are recording means 22 to accumulate the communication link information to which it was sent from communication link information transfer equipment 1, and a junction transfer means 23 to perform a junction transfer with the migration host 3 -- since -- it is constituted.

[0020] Next, actuation of the migration communication system of this invention is explained. First, the migration host 3 presupposes that it is cut from the network which is making current connection. The migration host 3 transmits the migration place address and a communication link information suspend request to the communications control means 11 as a communication message.

[0021] If the communication link information repeating installation 2 does not exist in a moved material network, the transfer means 13 notifies the migration host 3 of the notice which can be cut. If the communication link information repeating installation 2 exists in a moved material network, the transfer means 13 will perform the junction suspend request of communication link information to the communication link information repeating installation 2. And the junction transfer means 23 of the communication link information repeating installation 2 notifies the migration host 3 of the notice which can be cut.

[0022] Moreover, when the communication link information repeating installation 2 does not exist in the migration host's 3 migration place network, the are recording means 12 accumulates the communication link information addressed to migration host 3. When the communication link information repeating installation 2 exists in the migration host's 3 migration place network, the junction are recording means 22 accumulates the communication link information addressed to migration host 3.

[0023] Next, suppose that the migration host 3 is connected to a migration place network. After the migration host's 3 connecting, if a communication link becomes possible, the resumption demand of a transfer will be notified as communication link propriety information. The migration host 3 notifies the resumption demand of a transfer to communication link information transfer equipment 1 irrespective of the existence of the existence of the communication link information repeating installation 2. When the communication link information repeating installation 2 exists on the path of the migration host 3 and communication link information transfer equipment 1, the communication link information from the migration host 3 surely goes via the communication link information repeating installation 2.

[0024] After the notice of resumption of a transfer, when the communication link information repeating installation 2 does not exist in a migration place network, the communication link information accumulated with the are recording means 12 of communication link information transfer equipment 1 is transmitted to the migration host 3, and an after that usual communication link resumes. When the communication link information repeating installation 2 exists in a migration place network, communication link information is transmitted to the migration host 3 from the junction are recording means 22 of the communication link information repeating installation 2, and an after that usual communication link resumes.

[0025] Next, it explains in detail that processing actuation of the migration communication system of this invention flows. Here, since communication link information is packet-ized, communication link information is explained as a packet henceforth. Drawing 2 is drawing showing the flow of processing actuation of migration communication system. migration -- communication system -- four -- a \*\* -- a subnet -- Net -- zero - three -- from -- becoming

-- a network -- a packet -- transmitting -- a packet -- a transfer -- equipment -- (-- HR --)  
 -- one -- a packet -- acting as intermediary -- a packet -- repeating installation -- (-- MR --)  
 -- two -- a -- 2b -- a router -- (-- Ra --) -- four -- migration -- a host -- (-- MH --) --  
 three -- since -- it is constituted.

[0026] The migration host (MH) 3 has home address addr\_h showing an identifier, and when having connected with Net1 and the address addr1 is connected to Net2 temporarily, when the address addr2 is connected to Net3, he has the address addr3 temporarily. Moreover, home address addr\_h belongs to Net0.

[0027] Packet transfer equipment (HR) 1 exists on Net0, manages correspondence with the address the migration host's (MH)'s 3 home address, and temporarily, and transmits the packet addressed to the migration host's (MH)'s 3 home address in the migration host's (MH)'s 3 current momentary address.

[0028] Packet repeating-installation (MR) 2a and (MR) 2b relays the packet between subnets. Packet repeating-installation (MR)2a is located at the node of Net0 and Net1, and packet repeating-installation (MR) 2b is located at the node of Net0 and Net2. Packet repeating-installation (MR) 2a and (MR) 2b has a function as a router, and the function which accumulates a packet.

[0029] A router (Ra) 4 is a router which is located at the node of Net0 and Net3, and relays a packet. drawing -- \*\*\*\* -- a packet -- repeating installation -- (-- MR --) -- two -- a -- minding -- a packet -- a transfer -- equipment -- (-- HR --) -- one -- from -- migration -- a host -- (-- MH --) -- three -- a packet -- transmitting -- having -- \*\*\*\* -- a situation -- being shown -- \*\*\*\*. That is, packet transfer equipment (HR) 1 has transmitted the packet addressed to the migration host's (MH)'s 3 home address addr\_h to the momentary address addr1 of the migration host's (MH)'s 3 Net1.

[0030] Drawing 3 is drawing showing a communication management table and a junction managed table. The table value in case the migration host (MH) 3 is connected to Net1 is shown. (A) is a communication management table in the communications control means of packet transfer equipment (HR) 1, and (B) and (C) are the junction managed tables in packet repeating-installation (MR)2a and the junction control means of 2b, respectively.

[0031] the table on which the communication management table of (A) supports home address addr\_h -- it is -- "the momentary address", and the migration host's (MH)'s 3 "flag" and "the existence of MR" -- since -- it is constituted. "The momentary address" is set up with addr 1-3, respectively as the momentary address in case a migration host (MH) connects with Net 1-3.

[0032] It is shown temporarily [ which ] a "flag" transmits a packet to the address, and a flag transmits the packet addressed to the home address to addressing to the momentary address of UP. Moreover, there is no address temporarily which is UP to the home address, and when it is DOWN altogether, packet transfer equipment (HR) accumulates the packet addressed to the home address with an are recording means.

[0033] If packet repeating installation (MR) exists in a subnet, it True(s) and "existence of MR" does not exist, it serves as False. Therefore, with the configuration of drawing 2, since the migration host (MH) 3 has connected with the "momentary address" addr 1, a "flag" serves as UP. And since packet repeating-installation (MR)2a exists in the trunk connection point, "existence of MR" serves as True. Moreover, since the migration host (MH) has not connected with the "momentary address" addr 2, a "flag" serves as DOWN. And since packet repeating installation (MR) exists in the trunk connection point, "existence of MR" serves as True. Furthermore, since the migration host (MH) has not connected with the "momentary address" addr 3, a "flag" serves as DOWN. And since packet repeating installation (MR) does not exist in the trunk connection point, "existence of MR" serves as False.

[0034] the junction managed table of (B) and (C) -- a migration host's (MH)'s "the momentary address" and "HR address", and a "flag" -- since -- it is constituted. When passing the packet of the communication link performed between a migration host's (MH)'s momentary address, and the packet transfer (equipment HR) address with packet repeating installation (MR), a flag serves as UP. When accumulating with the junction are recording means of packet repeating installation (MR), a flag serves as DOWN.

[0035] Therefore, with the configuration of drawing 2, since the packet is relayed to the "momentary address" addr 1 between "HR address" addr\_HR, a flag serves as UP. Moreover, between "HR address" addr\_HR, the packet is not relayed to the "momentary address" addr 2. For this reason, a flag is set to DOWN and it is set as the mode which accumulates a packet.

[0036] Next, a host is cut from a subnet and the case where it moves to other subnets is explained in detail using drawing 4 - drawing 6. Drawing 4 is drawing in case the migration host (MH) 3 cuts from Net1 and moves to Net2. This shows the situation of migration in case packet repeating installation (MR) exists in both migration places Net2 the moved material Net1. Since the configuration of migration communication system is the same as that of drawing 2, explanation of a configuration is omitted.

[0037] Drawing 5 is a flow chart which shows procedure in case a migration host (MH) cuts from Net1 and moves to Net2.

[S1] The migration host (MH) 3 interrupts the packet transmission from self, and transmits the notice of the migration place address addr2, and the suspend request of a packet transfer to the communications control means of packet transfer equipment (HR) 1.

[S2] The communications control means of packet transfer equipment (HR) 1 changes the flag of addr1 of an own communication management table into DOWN, and if it checks that packet repeating installation (MR) 2b is in Net2 of addr2, it will change the flag of addr2 into UP.

[S3] The communications control means of packet transfer equipment (HR) 1 checks whether packet repeating installation (MR) exists in Net1 which is addr1 from a communication management table. When packet repeating installation (MR) does not exist on Net1, it goes to step S4, and when packet repeating installation (MR) exists on Net1, it goes to step S5. Here, since packet repeating installation (MR)2a exists on Net1 of addr1, it goes to step S5.

[S4] The communications control means of packet transfer equipment (HR) 1 notifies the migration host (MH) 3 of cutting with Net1 being possible.

[S5] The communications control means of packet transfer equipment (HR) 1 requires interruption of packet junction of the junction control means of packet repeating installation (MR)2a.

[ -- S -- six -- ] -- a packet -- repeating installation -- ( -- MR -- ) -- two -- a -- junction -- a control means -- a suspend request -- winning popularity -- if -- junction -- management -- a table -- addr -- one -- a flag -- DOWN -- having carried out -- after -- migration -- a host -- ( -- MH -- ) -- three -- Net -- one -- cutting -- being possible -- things -- notifying .

[S7] The transfer means of packet transfer equipment (HR) 1 transmits the packet addressed to the migration host's (MH)'s 3 home address addr\_h to the address addr2 temporarily.

[S8] Since the flag of addr2 of a junction managed table is DOWN, packet repeating installation (MR) 2b accumulates the addressing packets 10a-10n to addr2 sent from packet transfer equipment (HR) 1 in junction are recording means 22b.

[0038] Drawing 6 is drawing showing a communication management table and a junction managed table until a migration host (MH) is cut from Net1 and moves to Net2. (A) is a communication management table in the communications control means of packet transfer equipment (HR) 1, and (B) and (C) are the junction managed tables in packet repeating installation (MR)2a and the junction control means of 2b. About a table value, since it mentioned above, explanation is omitted.

[0039] Next, resumption of junction is explained in detail using drawing 7 - drawing 9. Drawing 7 is drawing which transmits the packet which packet repeating installation (MR) accumulated to a migration host (MH), and resumes junction. It connects with Net2 and the migration host (MH) 3 will be in the condition which can communicate. Then, the packets 10a-10n accumulated in junction are recording means 22b of packet repeating installation (MR) 2b are transmitted to the migration host (MH) 3, and junction resumes. Then, packet communication is performed between packet transfer equipment (HR) 1 and the migration host (MH) 3. Since the configuration of migration communication system is the same as that of drawing 2, explanation of a configuration is omitted.

[0040] Drawing 8 is a flow chart which shows procedure in case the migration host (MH) 3 moves to Net2 and junction resumes.

[S10] If the migration host (MH) 3 connects with Net2 in the address addr2 temporarily, he will transmit a transfer request to the communications control means of packet transfer equipment (HR) 1.

[S11] Packet repeating-installation (MR) 2b detects the transfer request sent from addr2, and transmits the packets 10a-10n addressed to addr2 accumulated in own are recording means 22b to the migration host (MH) 3.

[S12] Packet repeating-installation (MR) 2b changes the flag of addr2 into UP, and resumes the junction of Net2 of the packet addressed to addr2. Packet transfer equipment (HR) 1 will change the flag of addr2 of a communications control table into UP, if a transfer request is received from the migration host (MH) 3. Here, it is already UP.

[S13] Packet communication resumes between packet transfer equipment (HR) 1 and the migration host (MH) 3 through packet repeating-installation (MR) 2b.

[0041] Drawing 9 is drawing showing a communication management table and a junction managed table in case junction resumes. (A) is a communication management table in the communications control means of packet transfer equipment (HR) 1, and (B) and (C) are the junction managed tables in packet repeating-installation (MR) 2a and the junction control means of 2b. About a table value, since it mentioned above, explanation is omitted.

[0042] Next, the case where the migration host (MH) 3 moves to Net3 from Net2 is explained in detail using drawing 10 - drawing 12. Drawing 10 is drawing showing the case where the migration host (MH) 3 moves to Net3 from Net2. This shows the situation of migration in case packet repeating installation (MR) does not exist in the migration place Net3. Since the configuration of migration communication system is the same as that of drawing 2, explanation of a configuration is omitted.

[0043] Drawing 11 is a flow chart in case the migration host (MH) 3 moves to Net3 from Net2.

[S20] The migration host (MH) 3 interrupts the packet transmission from self, and transmits the notice of the address addr3, and the suspend request of a packet transfer to the notice control means of packet transfer equipment (HR) 1 temporarily [ migration place ].

[S21] The communications control means of packet transfer equipment (HR) 1 changes the flag of addr2 of an own communications control managed table into DOWN, it checks that packet repeating installation (MR) does not exist in Net3 of addr3, and the flag of addr3 is not changed with DOWN.

[S22] The communications control means of packet transfer equipment (HR) 1 checks whether packet repeating installation (MR) exists in Net2 which is addr2 of a moved material from a communications control table. When packet repeating installation (MR) does not exist on Net2, it goes to step S23, and when packet repeating installation (MR) exists on Net2, it goes to step S24. Here, since packet repeating-installation (MR) 2b exists on Net2 of addr2, it goes to step S24.

[S23] The communications control means of packet transfer equipment (HR) 1 notifies the migration host (MH) 3 of cutting with Net2 being possible.

[S24] The communications control means of packet transfer equipment (HR) 1 requires interruption of packet junction of the junction control means of packet repeating-installation (MR) 2b.

[S25] The junction control means of packet repeating-installation (MR) 2b will set the flag of addr2 of a junction managed table to DOWN, if a suspend request is received, and it notifies the migration host (MH) 3 of cutting with Net2 being possible. Here, it is already DOWN.

[S26] Since the flag of addr3 of a communication management table is DOWN, packet transfer equipment (HR) 1 accumulates the addressing packet to addr3 in the are recording means 12.

[0044] Drawing 12 is drawing showing the communication management table and junction managed table at the time of the migration host (MH) 3 moving to Net3 from Net2. (A) is a communication management table in the communications control means of packet transfer equipment (HR) 1, and (B) and (C) are the junction managed tables in packet repeating-installation (MR) 2a and the junction control means of 2b. About a table value, since it mentioned above, explanation is omitted.

[0045] Drawing 13 is drawing where the packet which packet repeating installation (MR)

accumulated is transmitted to a migration host (MH), and junction is resumed. It connects with Net3 and the migration host (MH) 3 will be in the condition which can communicate. Then, the packets 10a-10n accumulated in the are recording means 12 of packet transfer equipment (HR) 1 are transmitted to the migration host (MH) 3 through a router (Ra) 4. After that, the usual packet communication is performed.

[0046] Next, the network example in which the migration communication system of this invention is applied is explained in detail. Drawing 14 is drawing in case a migration host moves between a wireless host's subnets. Two base transceiver stations r1 and r2 which exist in Net4 form the cel of wireless subnets net1 and net2 different, respectively. When wireless (host MH) 3a moves to the cel of a base transceiver station r2 from the cel of a base transceiver station r1, it will move between wireless subnets which are different from the wireless subnet net1 to the wireless subnet net2. In such a case, if a communication relay group is arranged between the wireless subnet net1 and the wireless subnet net2, it is possible to realize migration communication system of this invention.

[0047] Drawing 15 is drawing in case a wireless host moves between a cable subnet and the wireless subnet which interconnected. Although the cel which each forms since base transceiver stations r3 and r4 function as a repeater is the same subnet as the cable network of a connection place, a subnet Net5 and a subnet Net6 are made by the routers Rc and Rd linked to a network Net0. Therefore, the subnet of the cel which base stations r3 and r4 form is set to Net5 and Net6, respectively. Therefore, when wireless (host MH) 3a moves to the cel of a base station r4 from the cel of a base station r3, a subnet which is different from a subnet Net5 to a subnet Net6 will be moved. In such a case, it is possible by arranging repeating installation between Net4 and Net5 or to either between Net4 and Net6 to realize migration communication system of this invention.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

**[Drawing 1]** It is the principle Fig. of the migration communication system of this invention.

**[Drawing 2]** It is drawing showing the flow of processing actuation of migration communication system.

**[Drawing 3]** It is drawing showing a communication management table and a junction managed table.

**[Drawing 4]** It is drawing in case a migration host (MH) cuts from Net1 and moves to Net2.

**[Drawing 5]** It is the flow chart which shows procedure in case a migration host (MH) cuts from Net1 and moves to Net2.

**[Drawing 6]** It is drawing showing a communication management table and a junction managed table.

**[Drawing 7]** It is drawing which transmits the packet which packet repeating installation (MR) accumulated to a migration host (MH), and resumes junction.

**[Drawing 8]** It is the flow chart which shows procedure in case a migration host (MH) moves to Net2 and junction resumes.

**[Drawing 9]** It is drawing showing a communication management table and a junction managed table.

**[Drawing 10]** It is drawing showing the case where a migration host (MH) moves to Net3 from Net2.

**[Drawing 11]** It is a flow chart in case a migration host (MH) moves to Net3 from Net2.

**[Drawing 12]** It is drawing showing a communication management table and a junction managed table.

**[Drawing 13]** It is drawing which transmits the packet which packet repeating installation (MR) accumulated to a migration host (MH), and junction resumes.

**[Drawing 14]** It is drawing in case a migration host moves between a wireless host's subnets.

**[Drawing 15]** It is drawing in case a wireless host moves between a cable subnet and the wireless subnet which interconnected.

**[Drawing 16]** It is drawing showing the configuration of the conventional technique.

**[Drawing 17]** It is drawing showing signs that a packet is transmitted to a migration host.

**[Description of Notations]**

1 Communication Link Information Transfer Equipment

2 Communication Link Information Repeating Installation

3 Migration Host

11 Communications Control Means

12 Are Recording Means

13 Transfer Means

21 Junction Control Means

22 Junction Are Recording Means

23 Junction Transfer Means

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[Translation done.]

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CORRECTION OR AMENDMENT

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[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law

[Section partition] The 3rd partition of the 7th section

[Publication date] July 19, Heisei 14 (2002. 7.19)

[Publication No.] JP,10-23071,A

[Date of Publication] January 23, Heisei 10 (1998. 1.23)

[Annual volume number] Open patent official report 10-231

[Application number] Japanese Patent Application No. 8-170888

[The 7th edition of International Patent Classification]

H04L 12/66

12/46

12/28

12/40

12/56

[FI]

H04L 11/20 B

11/00 310 C

320

11/20 102 Z

[Procedure revision]

[Filing Date] April 19, Heisei 14 (2002. 4.19)

[Procedure amendment 1]

[Document to be Amended] Specification

[Item(s) to be Amended] The name of invention

[Method of Amendment] Modification

[Proposed Amendment]

[Title of the Invention] Migration communication system and a migration correspondence procedure

[Procedure amendment 2]

[Document to be Amended] Specification

[Item(s) to be Amended] Claim

[Method of Amendment] Modification

[Proposed Amendment]

[Claim(s)]

[Claim 1] In the migration communication system with which a migration host moves between networks, being accompanied by modification of the address, and a communication link is continuously performed before and after migration, a junction transfer means carry out a junction transfer of said communication link information



with said migration host when good in a junction are-recording means accumulate the communication link information addressed to said migration host when said migration host cannot communicate, and a communication link [ host / said / migration ], and the junction control means carry out control with said junction are-recording means and said junction transfer means based on said migration host's communication link propriety information -- since -- the communication link information repeating installation constituted, a communications control means perform control with said are-recording means and said transfer means based on an are-recording means accumulate said communication link information addressed to said migration host, a transfer means transmit said communication link information to said migration host, and said communication link information repeating installation's existence information and the communication message from said migration host -- since -- the communication link information-transfer equipment constituted, Migration communication system characterized by \*\*\*\*(ing).

[Claim 2] the flag which shows whether said communications control means transmits said communication link information to the address the address and temporarily [ said ] temporarily which shows the location on said network which said migration host has, and the item which shows the existence of the existence of said communication link information repeating installation -- since -- the migration communication system according to claim 1 characterized by including the communication management table constituted.

[Claim 3] said junction control means passes said communication link information to said communication link information repeating installation with the address and the home address of said communication link information-transfer equipment temporarily which shows the location on said network which said migration host has, or is stored up -- the item which shows that either -- since -- the migration communication system according to claim 1 characterized by to include the junction managed table constituted.

[Claim 4] It is the migration communication system according to claim 1 with which said transfer means is characterized by transmitting the notice of cutting propriety to said migration host as said communication link information when said migration host is cut from said network.

[Claim 5] It is the migration communication system according to claim 1 with which said transfer means is characterized by transmitting the notice of a junction suspend request to said communication link information repeating installation as said communication link information when said migration host is cut from said network.

[Claim 6] It is the migration communication system according to claim 1 with which said junction transfer means is characterized by transmitting the notice of cutting propriety to said migration host as said communication link information when said migration host is cut from said network.

[Claim 7] In the communication link information repeating installation which relays the communication link information addressed to a migration host in case a migration host moves between networks, being accompanied by modification of the address,

It is a junction are recording means to accumulate the communication link information addressed to a migration host when said migration host cannot communicate,

It is a junction transfer means to perform a junction transfer of said communication link information with said migration host when a communication link of said migration host is good, The junction control means which performs control with said junction are recording means and said junction transfer means based on said migration host's communication link propriety information,

Communication link information repeating installation characterized by \*\*\*\*(ing).

[Claim 8] In the communication link information transfer equipment which transmits communication link information to a migration host in case a migration host moves between networks, being accompanied by modification of the address,

An are recording means to accumulate said communication link information addressed to a migration host,

A transfer means to transmit said communication link information to said migration host, a communications control means to resemble the communication link information repeating installation's existence information that said communication link information addressed to a

migration host is relayed, and the communication message from said migration host, and for it to be based, and to perform control with said are recording means and said transfer means, Communication link information transfer equipment characterized by \*\*\*\*(ing).

[Claim 9] In the migration correspondence procedure controlled for a migration host to move between networks, being accompanied by modification of the address, and to communicate continuously before and after migration,

When a migration host cuts the migration place address from a network after a notice to communication link information transfer equipment and communication link information repeating installation exists in a migration place network, said communication link information repeating installation accumulates the communication link information addressed to a migration host, When said communication link information repeating installation does not exist, said communication link information transfer equipment accumulates said communication link information,

When a migration host connects with a migration place network and said communication link information repeating installation exists in a migration place network, said communication link information repeating installation transmits communication link information to a migration host, It is the migration correspondence procedure characterized by carrying out transfer direct of said communication link information to a migration host from said communication link information transfer equipment when said communication link information repeating installation does not exist in a migration place network.

[Procedure amendment 3]

[Document to be Amended] Specification

[Item(s) to be Amended] 0001

[Method of Amendment] Modification

[Proposed Amendment]

[0001]

[Field of the Invention] It is related about migration communication system and a migration correspondence procedure to the migration correspondence procedure by which the migration communication system and the migration host with whom the migration host who moves between networks while being accompanied by modification of the address communicates continuously before and after migration control between networks to move being accompanied by modification of the address and to communicate continuously before and after migration especially in this invention.

[Procedure amendment 4]

[Document to be Amended] Specification

[Item(s) to be Amended] 0014

[Method of Amendment] Modification

[Proposed Amendment]

[0014] This invention is made in view of such a point, and it aims at offering the migration communication system which suppresses short the time delay of the packet communication accompanying migration between networks. Moreover, other purposes of this invention are offering the migration correspondence procedure which suppresses short the time delay of the packet communication accompanying migration between networks.

[Procedure amendment 5]

[Document to be Amended] Specification

[Item(s) to be Amended] 0048

[Method of Amendment] Modification

[Proposed Amendment]

[0048]

[Effect of the Invention] As explained above, migration communication system of this invention was considered as the configuration which communicates by arranging communication link information repeating installation between communication link information transfer equipment and a migration host. Thereby, even if the communication range between communication link information transfer equipment and a migration host is long, delay of communication link

information transfer can be decreased and it enables a migration host to shorten the time of delivery of the communication link information when connecting on a new network. Moreover, the migration correspondence procedure of this invention decided to communicate by arranging communication link information repeating installation between communication link information transfer equipment and a migration host. Thereby, even if the communication range between communication link information transfer equipment and a migration host is long, delay of communication link information transfer can be decreased and it enables a migration host to shorten the time of delivery of the communication link information when connecting on a new network.

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[Translation done.]

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開平10-23071

(43) 公開日 平成10年(1998) 1月23日

(51) Int.Cl. <sup>8</sup>	識別記号	序内整理番号	F I	技術表示箇所
H 0 4 L 12/66		9744-5K	H 0 4 L 11/20	B
12/46			11/00	3 1 0 C
12/28				3 2 0
12/40		9744-5K	11/20	1 0 2 Z
12/56				

審査請求 未請求 請求項の数 6 O L (全 12 頁)

(21) 出願番号 特願平8-170888

(22) 出願日 平成 8 年 (1996) 7 月 1 日

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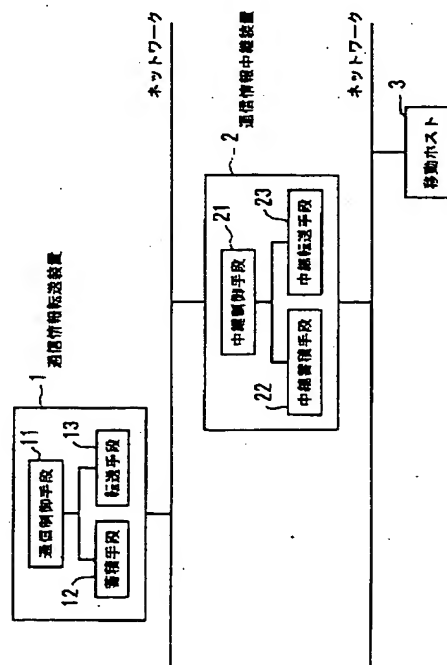
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(54) 【発明の名称】 移動通信システム

(57) 【要約】

【課題】 ネットワーク間の移動に伴うバケット通信の遅延時間を短く抑える移動通信システムを提供することを目的とする。

【解決手段】 中継蓄積手段 2 2 は、移動ホスト 3 が通信不可の場合は、移動ホスト 3 宛の通信情報を蓄積する。中継転送手段 2 3 は、移動ホスト 3 が通信可の場合は、移動ホスト 3 との通信情報の中継転送を行う。中継制御手段 2 1 は、移動ホスト 3 の通信可否情報にもとづいて中継蓄積手段 2 2 と中継転送手段 2 3 との制御を行う。蓄積手段 1 2 は、移動ホスト 3 宛の通信情報を蓄積する。転送手段 1 3 は、移動ホスト 3 に通信情報を転送する。通信制御手段 1 1 は、通信情報中継装置 2 の存在情報と移動ホスト 3 からの通信メッセージとにもとづいて蓄積手段 1 2 と転送手段 1 3 との制御を行う。



## 【特許請求の範囲】

【請求項1】 移動ホストが、ネットワーク間をアドレスの変更を伴いながら移動して、移動の前後で継続的に通信が行われる移動通信システムにおいて、

前記移動ホストが通信不可の場合は、前記移動ホスト宛の通信情報を蓄積する中継蓄積手段と、前記移動ホストが通信可の場合は、前記移動ホストとの前記通信情報の中継転送を行う中継転送手段と、前記移動ホストの通信可否情報にもとづいて前記中継蓄積手段と前記中継転送手段との制御を行う中継制御手段と、から構成される通信情報中継装置と、

前記移動ホスト宛の前記通信情報を蓄積する蓄積手段と、前記移動ホストに前記通信情報を転送する転送手段と、前記通信情報中継装置の存在情報と前記移動ホストからの通信メッセージとにもとづいて前記蓄積手段と前記転送手段との制御を行う通信制御手段と、から構成される通信情報転送装置と、

を有することを特徴とする移動通信システム。

【請求項2】 前記通信制御手段は、前記移動ホストが持つ前記ネットワーク上の位置を示す一時アドレスと、前記一時アドレスに前記通信情報を転送する可否を示すフラグと、前記通信情報中継装置の存在の有無を示す項目と、から構成される通信管理テーブルを含むことを特徴とする請求項1記載の移動通信システム。

【請求項3】 前記中継制御手段は、前記移動ホストが持つ前記ネットワーク上の位置を示す一時アドレスと、前記通信情報転送装置のホームアドレスと、前記通信情報中継装置に対し前記通信情報を通過させるか、あるいは蓄積させるかのいずれかを示す項目と、から構成される中継管理テーブルを含むことを特徴とする請求項1記載の移動通信システム。

【請求項4】 前記移動ホストが前記ネットワークから切断される場合は、前記転送手段が、前記通信情報として切断可否通知を前記移動ホストへ転送することを特徴とする請求項1記載の移動通信システム。

【請求項5】 前記移動ホストが前記ネットワークから切断される場合は、前記転送手段が、前記通信情報として中継中断要求通知を前記通信情報中継装置へ転送することを特徴とする請求項1記載の移動通信システム。

【請求項6】 前記移動ホストが前記ネットワークから切断される場合は、前記中継転送手段が、前記通信情報として切断可否通知を前記移動ホストへ転送することを特徴とする請求項1記載の移動通信システム。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は移動通信システムに関し、特にネットワーク間をアドレスの変更を伴いながら移動する移動ホストが、移動の前後で継続的に通信を行う移動通信システムに関する。

【0002】

【従来の技術】 近年のコンピュータの小型化とコンピュータネットワークの普及により、ネットワークに接続されたホストを一時的にネットワークから切り離して持ち運び、移動先で再びネットワークに接続する通信システムが使用されている。

【0003】 ネットワークは、同じネットワークアドレスを共有するサブネットを複数相互接続することにより構成され、ネットワーク上のホストには、接続するサブネットに応じたアドレスが割り当てられる。

【0004】 そこで、ネットワーク上をアドレスの変更を伴って移動する移動ホストに対して、移動ホストの識別子として使用されるホームアドレスと、ネットワーク上の位置を示す一時アドレスとが割り当てられる。ホームアドレスは、ホストの識別に使用するのでホストの移動によって変化することはないが、一時アドレスはホストが接続したサブネットに応じて変化する。

【0005】 また、移動ホスト上の通信プログラム及びその通信相手である他のホスト上のプログラムは、その通信時にホームアドレスを使用して移動ホストを識別するので、ホストの移動の前後で継続的に通信することができる。

【0006】 さらに、ホームアドレスと一時アドレスの対応をネットワーク上のいずれかのホストで管理するためのバケット転送装置をネットワーク上に配置する。これにより、ホームアドレス宛のバケットは一時アドレス宛に転送されて、目的のホストへ送り届けられる。

【0007】 このようにホストが移動した場合は、アドレスの変更は自動的に行われるが、すでにネットワーク上に流れた一時アドレス宛のバケットは、アドレスの変更が完了するまでに破棄されてしまう。したがって、バケットの送り先である移動ホストが受信可能な状態になるまで、移動ホスト宛のバケットを蓄積する必要がある。

【0008】 バケットの蓄積を行うものとして、例えば、特開平5-83260号公報があり、バケット蓄積手段をバケット転送装置に備えて、移動ホストが受信可能な状態になるまで移動ホスト宛のバケットを蓄積している。

【0009】 図16は、上記の従来技術の構成を示す図である。3つのサブネットNet10~12からなるネットワークと、移動ホスト(MH)300と、バケット転送装置(HR)100と、ルータRb、Reと、から構成される。移動ホスト(MH)300は、識別子を表すホームアドレスと物理的な位置を表す一時アドレスを持つ。ホームアドレスは、他のホストが移動ホスト(MH)300を同じネットワーク上で識別するのに使用され、Net10に属する。

【0010】 バケット転送装置(HR)100は、Net10上に存在し、移動ホスト(MH)300のホームアドレスと一時アドレスの対応を管理し、移動ホスト

(MH) 300のホームアドレス宛のバケットを現在の一時アドレス宛に転送する。

【0011】ルータRbとルータReは、異なるサブネットワークを接続し、サブネットワーク間のバケットを中継する。まず、移動ホスト(MH)300がNet11から切断されるとする。この場合に移動ホスト(MH)300宛へのバケット101a~101nは、バケット転送装置(HR)100に属しているバケット蓄積部101で蓄積される。

【0012】図17は、移動ホストへバケットが転送される様子を示す図である。移動ホスト(MH)300がNet11から切断され、Net12に接続されている。接続後は、バケット蓄積部101で蓄積していたバケット101a~101nが、ルータReとルータRbで中継されて移動ホスト(MH)300に転送され、その後は通常のバケット通信が行われる。

【0013】

【発明が解決しようとする課題】しかし、上記のような従来技術では、移動ホストが他のネットワークへ移動するといったような通信不可能な状態になる場合は、移動ホストの位置にかかわらずバケット転送装置でバケットは蓄積されることになる。このため、移動ホストが通信可能となった場合でも、バケット転送装置と移動ホスト間の通信距離に応じて、蓄積されたバケットが移動ホストに到達するまでに遅延が発生し、移動ホストはバケットを受信する間、相当時間待たされるという問題点があった。

【0014】本発明はこのような点に鑑みてなされたものであり、ネットワーク間の移動に伴うバケット通信の遅延時間を短く抑える移動通信システムを提供することを目的とする。

【0015】

【課題を解決するための手段】上記課題を解決するために、移動ホストが、ネットワーク間をアドレスの変更を伴いながら移動して、移動の前後で継続的に通信が行われる移動通信システムにおいて、前記移動ホストが通信不可の場合は、前記移動ホスト宛の通信情報を蓄積する中継蓄積手段と、前記移動ホストが通信可の場合は、前記移動ホストとの前記通信情報の中継転送を行う中継転送手段と、前記移動ホストの通信可否情報にもとづいて前記中継蓄積手段と前記中継転送手段との制御を行う中継制御手段と、から構成される通信情報中継装置と、前記移動ホスト宛の前記通信情報を蓄積する蓄積手段と、前記移動ホストに前記通信情報を転送する転送手段と、前記通信情報中継装置の存在情報と前記移動ホストからの通信メッセージとにもとづいて前記蓄積手段と前記転送手段との制御を行う通信制御手段と、から構成される通信情報転送装置と、を有することを特徴とする移動通信システムが提供される。

【0016】ここで、移動ホストが移動先アドレスを通

信情報転送装置へ通知後にネットワークから切断すると、通信情報転送装置は移動ホスト宛の通信情報の転送先を移動先アドレスへ切り替える。そして、移動先ネットワークの通信情報中継装置が有する中継蓄積手段は、移動ホスト宛の通信情報を蓄積する。移動後、新しいネットワークに接続して通信可能であるならば、中継転送手段は、移動ホストに通信情報の転送を行う。中継制御手段は、移動ホストの通信可否情報にもとづいて中継蓄積手段と中継転送手段との制御を行う。

10 【0017】また、移動ホストがネットワークから切断し、移動先のネットワークに通信情報中継装置が存在しない場合は、通信情報転送装置が有する蓄積手段は通信情報を蓄積する。そして、転送手段は移動ホストに直接通信情報を転送する。あるいは、移動先のネットワークに通信情報中継装置が存在する場合は、蓄積手段で通信情報を蓄積せずに、転送手段からの通信情報は通信情報中継装置を経由して移動ホストに転送される。通信制御手段は、通信情報中継装置の存在情報と移動ホストからのアドレス等を含む通信メッセージとにもとづいて蓄積手段と転送手段との制御を行う。

【0018】

【発明の実施の形態】以下、本発明の実施の形態を図面にもとづいて説明する。図1は、本発明の移動通信システムの原理図である。移動通信システムは、通信情報を転送する通信情報転送装置1と、ネットワーク間の通信情報を中継する通信情報中継装置2と、ホームアドレスと一時アドレスを持つ移動ホスト3と、から構成される。通信情報転送装置1は、通信情報の通信制御を行う通信制御手段11と、通信情報を蓄積する蓄積手段12と、通信情報を移動ホスト3へ転送する転送手段13と、から構成される。

【0019】通信情報中継装置2は、通信情報の中継制御を行う中継制御手段21と、通信情報転送装置1から送られた通信情報を蓄積する中継蓄積手段22と、移動ホスト3と中継転送を行う中継転送手段23と、から構成される。

【0020】次に、本発明の移動通信システムの動作について説明する。まず、移動ホスト3が現在接続しているネットワークから切断されるとする。移動ホスト3は、通信メッセージとして移動先アドレスと通信情報中継要求とを通信制御手段11に転送する。

【0021】移動元ネットワークに通信情報中継装置2が存在しなければ、転送手段13は切断可能通知を移動ホスト3に通知する。移動元ネットワークに通信情報中継装置2が存在すれば、転送手段13はその通信情報中継装置2に通信情報の中継中断要求を行う。そして、通信情報中継装置2の中継転送手段23が切断可能通知を移動ホスト3に通知する。

【0022】また、移動ホスト3の移動先ネットワークに通信情報中継装置2が存在しない場合は、蓄積手段1

2は移動ホスト3宛の通信情報を蓄積する。移動ホスト3の移動先ネットワークに通信情報中継装置2が存在する場合は、中継蓄積手段2.2が移動ホスト3宛の通信情報を蓄積する。

【0023】次に、移動先ネットワークに移動ホスト3が接続されるとする。移動ホスト3が接続後、通信可能になると通信可否情報として転送再開要求を通知する。移動ホスト3は通信情報中継装置2の存在の有無にかかわらず、通信情報転送装置1へ転送再開要求を通知する。通信情報中継装置2は移動ホスト3と通信情報転送装置1との経路上に存在する場合は、移動ホスト3からの通信情報は必ず通信情報中継装置2を経由する。

【0024】転送再開の通知後、移動先ネットワークに通信情報中継装置2が存在しない場合は、通信情報転送装置1の蓄積手段1.2で蓄積された通信情報が移動ホスト3に転送され、その後通常の通信が再開する。移動先ネットワークに通信情報中継装置2が存在する場合は、通信情報中継装置2の中継蓄積手段2.2から通信情報が移動ホスト3に転送され、その後通常の通信が再開する。

【0025】次に、本発明の移動通信システムの処理動作の流れについて詳しく説明する。ここで、通信情報はバケット化されているので、以降は通信情報をバケットとして説明する。図2は、移動通信システムの処理動作の流れを示す図である。移動通信システムは、4つのサブネットNet0～3からなるネットワークと、バケットを転送するバケット転送装置(HR)1と、バケットを中継するバケット中継装置(MR)2a、2bと、ルータ(Ra)4と、移動ホスト(MH)3と、から構成される。

【0026】移動ホスト(MH)3は、識別子を表すホームアドレスaddr\_hを持ち、Net1に接続している場合は一時アドレスaddr1を、Net2に接続している場合は一時アドレスaddr2を、Net3に接続している場合は一時アドレスaddr3を持つ。また、ホームアドレスaddr\_hは、Net0に属する。

【0027】バケット転送装置(HR)1は、Net0上に存在し、移動ホスト(MH)3のホームアドレスと一時アドレスとの対応を管理し、移動ホスト(MH)3のホームアドレス宛のバケットを移動ホスト(MH)3の現在の一時アドレスで転送する。

【0028】バケット中継装置(MR)2a、(MR)2bは、サブネット間でのバケットを中継する。バケット中継装置(MR)2aはNet0とNet1の接続点に位置し、バケット中継装置(MR)2bはNet0とNet2との接続点に位置する。バケット中継装置(MR)2a、(MR)2bは、ルータとしての機能とバケットを蓄積する機能を持つ。

【0029】ルータ(Ra)4は、Net0とNet3

の接続点に位置してバケットの中継を行うルータである。図では、バケット中継装置(MR)2aを介して、バケット転送装置(HR)1から移動ホスト(MH)3へバケットが送信されている様子を示している。すなわち、バケット転送装置(HR)1は移動ホスト(MH)3のホームアドレスaddr\_h宛のバケットを移動ホスト(MH)3のNet1の一時アドレスaddr1へ転送している。

【0030】図3は、通信管理テーブルと中継管理テーブルとを示す図である。移動ホスト(MH)3がNet1に接続されている場合のテーブル値が示されている。

(A)はバケット転送装置(HR)1の通信制御手段内にある通信管理テーブルで、(B)と(C)はそれぞれバケット中継装置(MR)2a、2bの中継制御手段内にある中継管理テーブルである。

【0031】(A)の通信管理テーブルは、ホームアドレスaddr\_hに対応しているテーブルであり、移動ホスト(MH)3の「一時アドレス」と、「フラグ」と、「MRの有無」と、から構成される。「一時アドレス」は、移動ホスト(MH)がNet1～3へ接続する場合の一時アドレスとしてそれぞれaddr1～3と設定されている。

【0032】「フラグ」は、どの一時アドレスへバケットを転送するかを示していて、フラグがUPの一時アドレス宛にホームアドレス宛のバケットを転送する。また、ホームアドレスに対してUPになっている一時アドレスがなく、すべてDOWNの場合は、バケット転送装置(HR)はそのホームアドレス宛のバケットを蓄積手段により蓄積する。

【0033】「MRの有無」は、サブネットにバケット中継装置(MR)が存在すればTrue、存在しなければFalseとなる。したがって、図2の構成では、「一時アドレス」addr1に移動ホスト(MH)3が接続しているために「フラグ」がUPとなる。そして、その中継接続点にバケット中継装置(MR)2aが存在するので、「MRの有無」はTrueとなる。また、「一時アドレス」addr2に移動ホスト(MH)が接続していないために「フラグ」がDOWNとなる。そして、その中継接続点にバケット中継装置(MR)が存在するので、「MRの有無」はTrueとなる。さらに、「一時アドレス」addr3に移動ホスト(MH)が接続していないために「フラグ」がDOWNとなる。そして、その中継接続点にバケット中継装置(MR)が存在しないので、「MRの有無」はFalseとなる。

【0034】(B)、(C)の中継管理テーブルは、移動ホスト(MH)の「一時アドレス」と、「HRアドレス」と、「フラグ」と、から構成される。移動ホスト(MH)の一時アドレスとバケット転送装置(HR)アドレス間で行われる通信のバケットをバケット中継装置(MR)で通過させる場合は、フラグがUPとなる。バ



ケット中継装置(MR)の中継蓄積手段で蓄積する場合は、フラグはDOWNとなる。

【0035】したがって、図2の構成では、「一時アドレス」addr1と「HRアドレス」addr\_HR間で、ケットの中継を行っているのでフラグはUPとなる。また、「一時アドレス」addr2と「HRアドレス」addr\_HR間では、ケットの中継を行っていない。このためフラグをDOWNにして、ケットを蓄積するモードに設定してある。

【0036】次に、ホストをサブネットから切断し、他のサブネットへ移動する場合について図4～図6を用いて詳しく説明する。図4は、移動ホスト(MH)3がNet1から切断し、Net2へ移動する場合の図である。これは、移動元Net1と移動先Net2の両方にケット中継装置(MR)が存在する場合の移動の様子を示している。移動通信システムの構成は、図2と同様なので構成の説明は省略する。

【0037】図5は、移動ホスト(MH)がNet1から切断し、Net2へ移動する場合の処理手順を示すフローチャートである。

【S1】移動ホスト(MH)3は、自身からのケット送信を中断し、移動先アドレスaddr2の通知と、ケット転送の中断要求とをケット転送装置(HR)1の通信制御手段へ転送する。

【S2】ケット転送装置(HR)1の通信制御手段は、自身の通信管理テーブルのaddr1のフラグをDOWNに変更し、addr2のNet2にケット中継装置(MR)2bがあることを確認するとaddr2のフラグをUPに変更する。

【S3】ケット転送装置(HR)1の通信制御手段は、通信管理テーブルからaddr1であるNet1にケット中継装置(MR)が存在するか否かを確認する。Net1上にケット中継装置(MR)が存在しない場合はステップS4に行き、Net1上にケット中継装置(MR)が存在する場合はステップS5に行く。ここでは、ケット中継装置(MR)2aがaddr1のNet1上に存在するので、ステップS5に行く。

【S4】ケット転送装置(HR)1の通信制御手段は、移動ホスト(MH)3へNet1との切断が可能であることを通知する。

【S5】ケット転送装置(HR)1の通信制御手段は、ケット中継装置(MR)2aの中継制御手段へケット中継の中断を要求する。

【S6】ケット中継装置(MR)2aの中継制御手段は、中断要求を受けると中継管理テーブルのaddr1のフラグをDOWNにした後、移動ホスト(MH)3へNet1との切断が可能であることを通知する。

【S7】ケット転送装置(HR)1の転送手段は、移動ホスト(MH)3のホームアドレスaddr\_h宛のケットを一時アドレスaddr2へ転送する。

【S8】ケット中継装置(MR)2bは、中継管理テーブルのaddr2のフラグがDOWNなので、ケット転送装置(HR)1から送られてくるaddr2宛のケット10a～10nを中継蓄積手段22bに蓄積する。

【0038】図6は、移動ホスト(MH)がNet1から切断され、Net2へ移動するまでの通信管理テーブルと中継管理テーブルとを示す図である。(A)はケット転送装置(HR)1の通信制御手段内にある通信管理テーブルで、(B)と(C)はケット中継装置(MR)2a、2bの中継制御手段内にある中継管理テーブルである。テーブル値については、上述したので説明は省略する。

【0039】次に、中継再開について図7～図9を用いて詳しく説明する。図7は、ケット中継装置(MR)が蓄積したケットを移動ホスト(MH)に送信して中継を再開する図である。移動ホスト(MH)3は、Net2に接続されて通信可能な状態になる。すると、ケット中継装置(MR)2bの中継蓄積手段22bに蓄積されていたケット10a～10nが移動ホスト(MH)3へ転送されて中継が再開する。その後、ケット転送装置(HR)1と移動ホスト(MH)3間でケット通信が行われる。移動通信システムの構成は、図2と同様なので構成の説明は省略する。

【0040】図8は、移動ホスト(MH)3がNet2へ移動して中継が再開する場合の処理手順を示すフローチャートである。

【S10】移動ホスト(MH)3は、Net2に一時アドレスaddr2で接続するとケット転送装置(HR)1の通信制御手段へ転送要求を送信する。

【S11】ケット中継装置(MR)2bは、addr2から送られた転送要求を検出し、自身の蓄積手段22bに蓄積されたaddr2宛のケット10a～10nを移動ホスト(MH)3へ送信する。

【S12】ケット中継装置(MR)2bは、addr2のフラグをUPに変更して、addr2宛のケットのNet2への中継を再開する。ケット転送装置(HR)1は、移動ホスト(MH)3から転送要求を受け取ると、通信制御テーブルのaddr2のフラグをUPに変更する。ここでは、すでにUPになっている。

【S13】ケット中継装置(MR)2bを介し、ケット転送装置(HR)1と移動ホスト(MH)3間でケット通信が再開する。

【0041】図9は、中継が再開する場合の通信管理テーブルと中継管理テーブルとを示す図である。(A)はケット転送装置(HR)1の通信制御手段内にある通信管理テーブルで、(B)と(C)はケット中継装置(MR)2a、2bの中継制御手段内にある中継管理テーブルである。テーブル値については、上述したので説明は省略する。



【0042】次に、移動ホスト(MH)3がNet2からNet3へ移動する場合を図10～図12を用いて詳しく説明する。図10は、移動ホスト(MH)3がNet2からNet3へ移動する場合を示す図である。これは、移動先Net3にバケット中継装置(MR)が存在しない場合の移動の様子を示している。移動通信システムの構成は、図2と同様なので構成の説明は省略する。

【0043】図11は、移動ホスト(MH)3がNet2からNet3へ移動する場合のフローチャートである。

【S20】移動ホスト(MH)3は、自身からのバケット送信を中断し、移動先一時アドレスaddr3の通知と、バケット転送の中断要求とをバケット転送装置(HR)1の通知制御手段へ転送する。

【S21】バケット転送装置(HR)1の通信制御手段は、自身の通信制御管理テーブルのaddr2のフラグをDOWNに変更し、addr3のNet3にバケット中継装置(MR)が存在しないことを確認し、addr3のフラグはDOWNのまま変更しない。

【S22】バケット転送装置(HR)1の通信制御手段は、通信制御テーブルから移動元のaddr2であるNet2にバケット中継装置(MR)が存在するか否かを確認する。Net2上にバケット中継装置(MR)が存在しない場合はステップS23に行き、Net2上にバケット中継装置(MR)が存在する場合はステップS24に行く。ここでは、バケット中継装置(MR)2bがaddr2のNet2上に存在するので、ステップS24に行く。

【S23】バケット転送装置(HR)1の通信制御手段は、移動ホスト(MH)3へNet2との切断が可能であることを通知する。

【S24】バケット転送装置(HR)1の通信制御手段は、バケット中継装置(MR)2bの中継制御手段へバケット中継の中断を要求する。

【S25】バケット中継装置(MR)2bの中継制御手段は、中断要求を受けると中継管理テーブルのaddr2のフラグをDOWNにし、移動ホスト(MH)3へNet2との切断が可能であることを通知する。ここでは、すでにDOWNになっている。

【S26】バケット転送装置(HR)1は、通信管理テーブルのaddr3のフラグがDOWNなので、addr3宛バケットを蓄積手段12に蓄積する。

【0044】図12は、移動ホスト(MH)3がNet2からNet3へ移動する際の通信管理テーブルと中継管理テーブルとを示す図である。(A)はバケット転送装置(HR)1の通信制御手段内にある通信管理テーブルで、(B)と(C)はバケット中継装置(MR)2a、2bの中継制御手段内にある中継管理テーブルである。テーブル値については、上述したので説明は省略する。

【0045】図13は、バケット中継装置(MR)が蓄積したバケットを移動ホスト(MH)に送信して中継が再開される図である。移動ホスト(MH)3は、Net3に接続されて通信可能な状態になる。すると、バケット転送装置(HR)1の蓄積手段12に蓄積されていたバケット10a～10nがルータ(Ra)4を介して移動ホスト(MH)3へ転送される。その後は、通常のバケット通信が行われる。

【0046】次に、本発明の移動通信システムが適用されるネットワークの具体例について詳しく説明する。図14は、無線ホストのサブネット間で移動ホストが移動する場合の図である。Net4に存在する2つの無線基地局r1とr2は、それぞれ異なる無線サブネットnet1、net2のセルを形成する。無線ホスト(MH)3aは無線基地局r1のセルから無線基地局r2のセルへ移動すると無線サブネットnet1から無線サブネットnet2へと異なる無線サブネット間を移動することになる。このような場合は、無線サブネットnet1と無線サブネットnet2間に無線中継装置を配置すれば、本発明の移動通信システムを実現することが可能である。

【0047】図15は、有線サブネットと相互接続した無線サブネット間を無線ホストが移動する場合の図である。無線基地局r3、r4は、リピータとして機能するのでそれぞれが形成するセルは、接続先の有線ネットワークと同一のサブネットであるが、ネットワークNet0に接続したルータRcとRdによって、サブネットNet5、サブネットNet6が作られる。よって、基地局r3、r4が形成するセルのサブネットは、それぞれNet5、Net6となる。したがって、無線ホスト(MH)3aが基地局r3のセルから基地局r4のセルへ移動すると、サブネットNet5からサブネットNet6へと異なるサブネットを移動することになる。このような場合は、Net4とNet5の間に、またはNet4とNet6の間のいずれかに中継装置を配置することによって、本発明の移動通信システムを実現することが可能である。

【0048】

【発明の効果】以上説明したように、本発明の移動通信システムは、バケット転送装置と移動ホスト間にバケット中継装置を配置して通信を行う構成とした。これにより、バケット転送装置と移動ホスト間の通信距離が長くても、バケット転送の遅延を減少することができ、移動ホストは新しいネットワーク上に接続した時のバケットの受信時間が短縮される。

【図面の簡単な説明】

【図1】本発明の移動通信システムの原理図である。

【図2】移動通信システムの処理動作の流れを示す図である。

【図3】通信管理テーブルと中継管理テーブルとを示す

図である。

【図4】移動ホスト(MH)がNet1から切断し、Net2へ移動する場合の図である。

【図5】移動ホスト(MH)がNet1から切断し、Net2へ移動する場合の処理手順を示すフローチャートである。

【図6】通信管理テーブルと中継管理テーブルとを示す図である。

【図7】パケット中継装置(MR)が蓄積したパケットを移動ホスト(MH)に送信して中継を再開する図である。

【図8】移動ホスト(MH)がNet2へ移動して中継が再開する場合の処理手順を示すフローチャートである。

【図9】通信管理テーブルと中継管理テーブルとを示す図である。

【図10】移動ホスト(MH)がNet2からNet3へ移動する場合を示す図である。

【図11】移動ホスト(MH)がNet2からNet3へ移動する場合のフローチャートである。

【図12】通信管理テーブルと中継管理テーブルとを示す\*

\*す図である。

【図13】パケット中継装置(MR)が蓄積したパケットを移動ホスト(MH)に送信して中継が再開する図である。

【図14】無線ホストのサブネット間で移動ホストが移動する場合の図である。

【図15】有線サブネットと相互接続した無線サブネット間を無線ホストが移動する場合の図である。

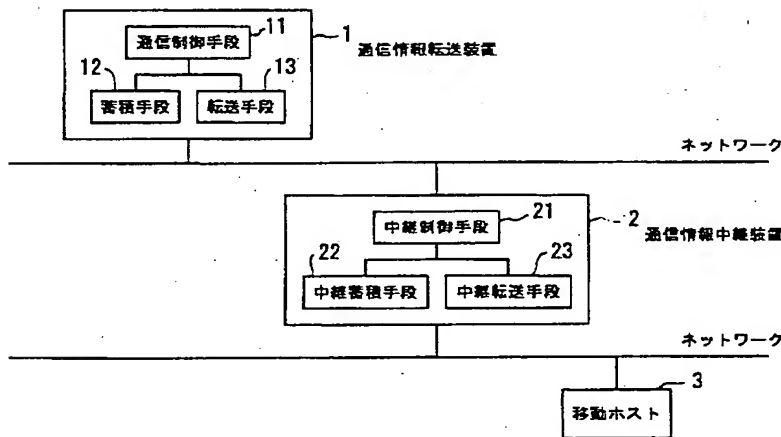
【図16】従来技術の構成を示す図である。

【図17】移動ホストへパケットが転送される様子を示す図である。

【符号の説明】

- 1 通信情報転送装置
- 2 通信情報中継装置
- 3 移動ホスト
- 11 通信制御手段
- 12 蓄積手段
- 13 転送手段
- 21 中継制御手段
- 22 中継蓄積手段
- 23 中継転送手段

【図1】



【図3】

(A)

一時アドレス	フラグ	MRの有無
addr1	UP	True
addr2	DOWN	True
addr3	DOWN	False

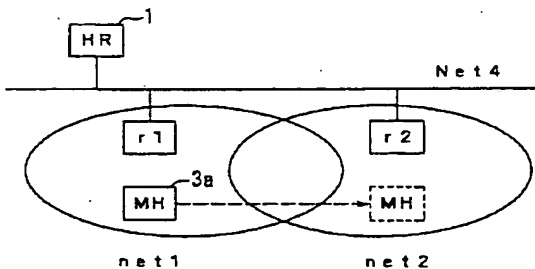
(B)

一時アドレス	HRアドレス	フラグ
addr1	addr_HR	UP

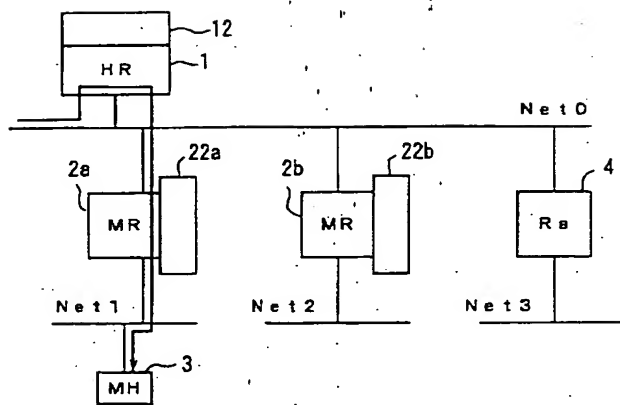
(C)

一時アドレス	HRアドレス	フラグ
addr2	addr_HR	DOWN

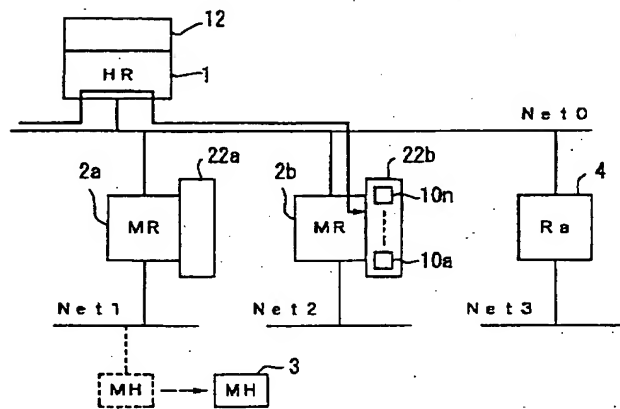
【図14】



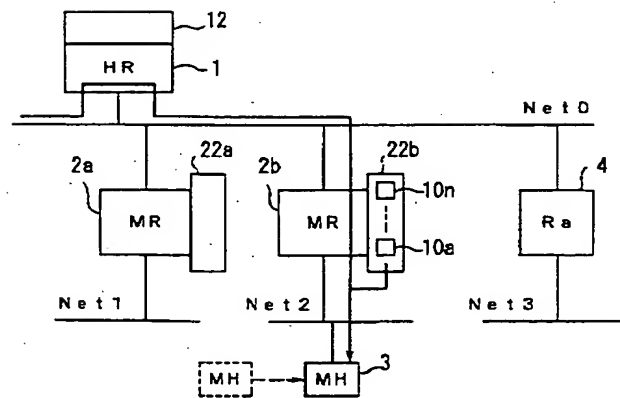
【図2】



【図4】



【図7】



【図6】

(A)

一時アドレス	フラグ	MRの有無
addr1	DOWN	True
addr2	UP	True
addr3	DOWN	False

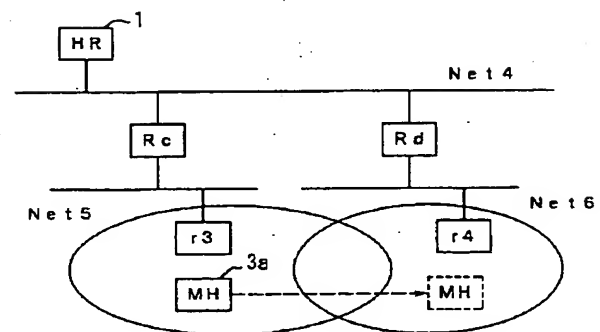
(B)

一時アドレス	HRアドレス	フラグ
addr1	addr_HR	DOWN

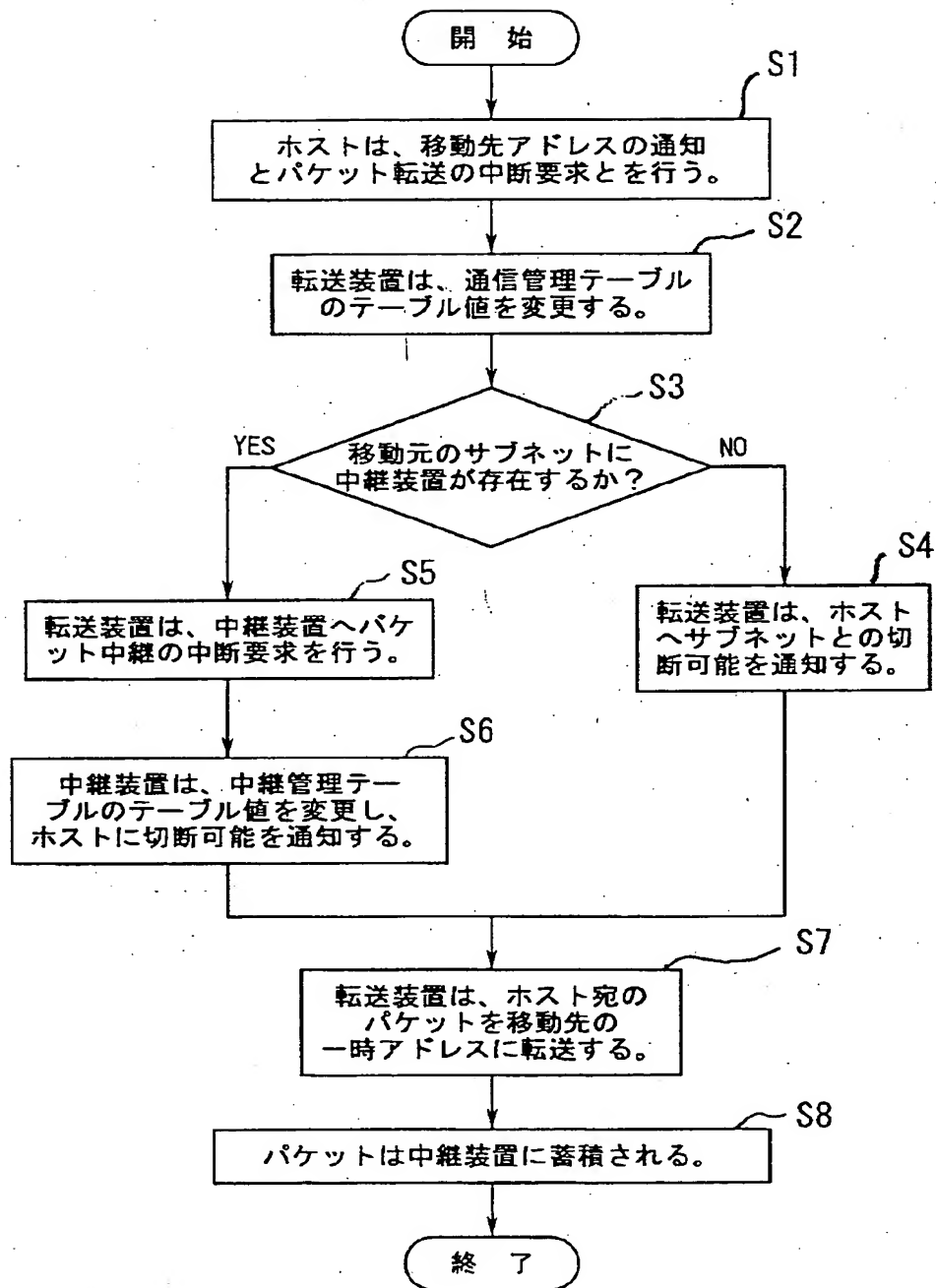
(C)

一時アドレス	HRアドレス	フラグ
addr2	addr_HR	DOWN

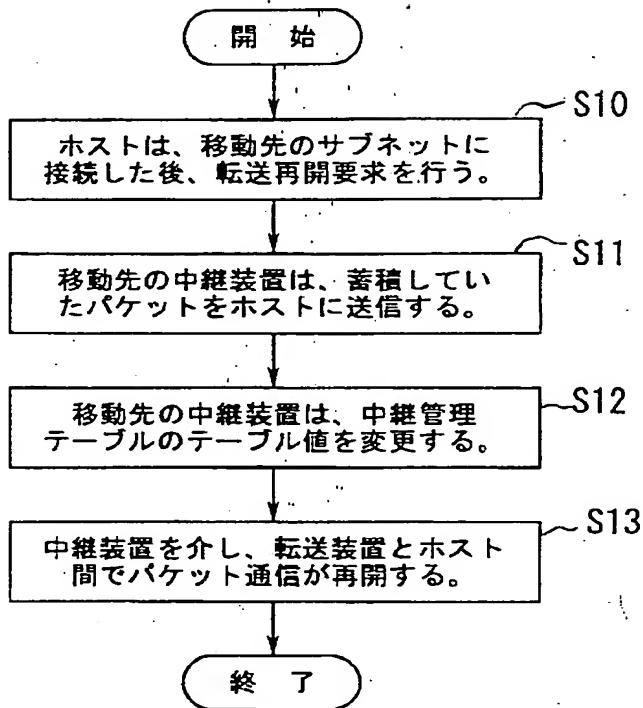
【図15】



【図5】



【圖8】



【圖9】.

(A)

一時アドレス	フラグ	MRの有無
addr1	DOWN	True
addr2	UP	True
addr3	DOWN	False

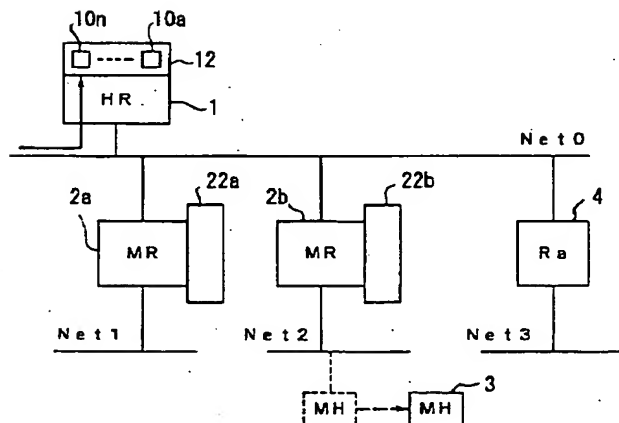
(B)

一時アドレス	HRアドレス	フラグ
addr1	addr_HR	DOWN

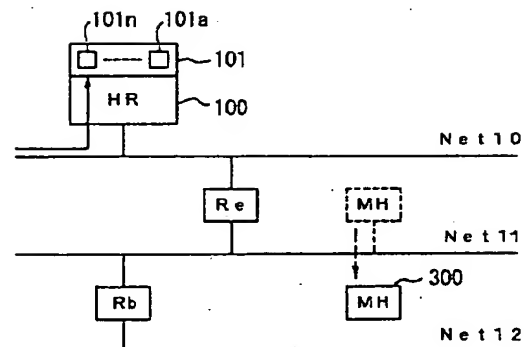
(C)

一時アドレス	HRアドレス	フラグ
addr2	addr_HR	UP

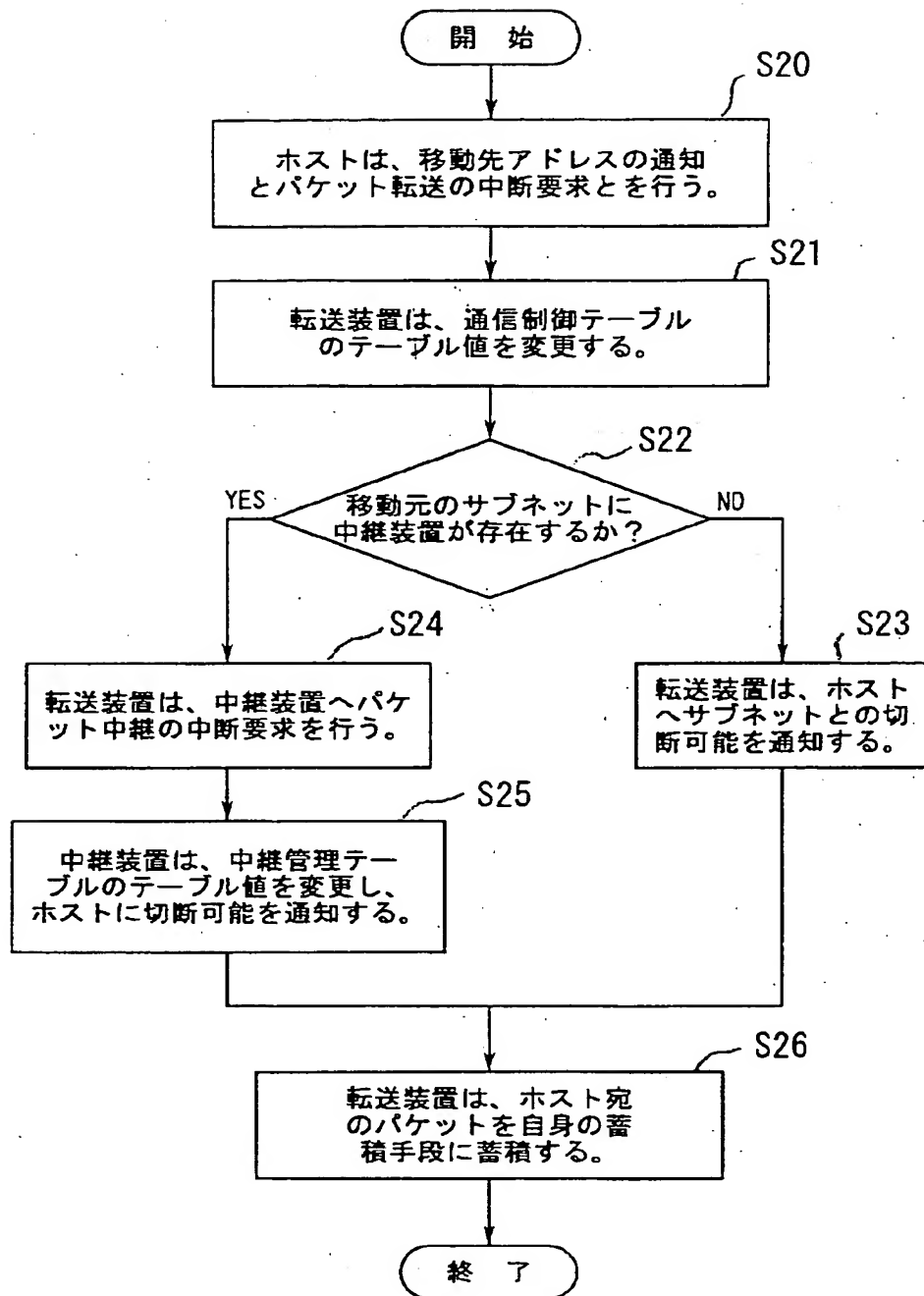
【圖 10】



【圖 16】



【図11】



【図12】

(A)

一時アドレス	フラグ	MRの有無
addr1	DOWN	True
addr2	DOWN	True
addr3	DOWN	False

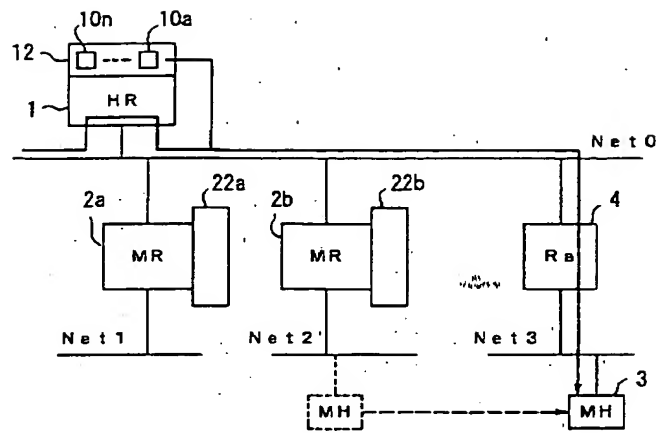
(B)

一時アドレス	HRアドレス	フラグ
addr1	addr_HR	DOWN

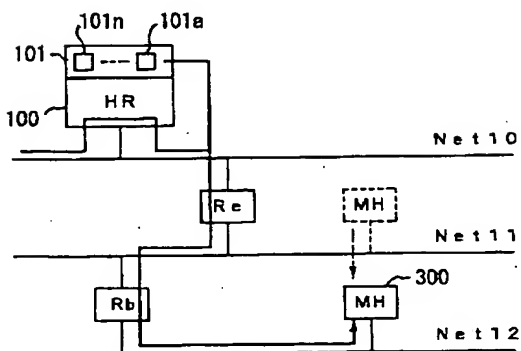
(C)

一時アドレス	HRアドレス	フラグ
addr2	addr_HR	DOWN

【図13】



【図17】



【公報種別】特許法第17条の2の規定による補正の掲載  
 【部門区分】第7部門第3区分  
 【発行日】平成14年7月19日(2002.7.19)

【公開番号】特開平10-23071  
 【公開日】平成10年1月23日(1998.1.23)  
 【年通号数】公開特許公報10-231  
 【出願番号】特願平8-170888  
 【国際特許分類第7版】

H04L 12/66  
 12/46  
 12/28  
 12/40  
 12/56

【F1】

H04L 11/20 B  
 11/00 310 C  
 320  
 11/20 102 Z

【手続補正書】  
 【提出日】平成14年4月19日(2002.4.19)

【手続補正1】  
 【補正対象書類名】明細書  
 【補正対象項目名】発明の名称  
 【補正方法】変更  
 【補正内容】

【発明の名称】 移動通信システム及び移動通信方法

【手続補正2】  
 【補正対象書類名】明細書  
 【補正対象項目名】特許請求の範囲  
 【補正方法】変更  
 【補正内容】  
 【特許請求の範囲】

【請求項1】 移動ホストが、ネットワーク間をアドレスの変更を伴いながら移動して、移動の前後で継続的に通信が行われる移動通信システムにおいて、前記移動ホストが通信不可の場合は、前記移動ホスト宛の通信情報を蓄積する中継蓄積手段と、前記移動ホストが通信可の場合は、前記移動ホストとの前記通信情報の中継転送を行う中継転送手段と、前記移動ホストの通信可否情報にもとづいて前記中継蓄積手段と前記中継転送手段との制御を行う中継制御手段と、から構成される通信情報中継装置と、前記移動ホスト宛の前記通信情報を蓄積する蓄積手段と、前記移動ホストに前記通信情報を転送する転送手段と、前記通信情報中継装置の存在情報と前記移動ホストからの通信メッセージとにもとづいて前記蓄積手段と前記転送手段との制御を行う通信制御手段と、から構成さ

れる通信情報転送装置と、

を有することを特徴とする移動通信システム。

【請求項2】 前記通信制御手段は、前記移動ホストが持つ前記ネットワーク上の位置を示す一時アドレスと、前記一時アドレスに前記通信情報を転送するか否かを示すフラグと、前記通信情報中継装置の存在の有無を示す項目と、から構成される通信管理テーブルを含むことを特徴とする請求項1記載の移動通信システム。

【請求項3】 前記中継制御手段は、前記移動ホストが持つ前記ネットワーク上の位置を示す一時アドレスと、前記通信情報転送装置のホームアドレスと、前記通信情報中継装置に対し前記通信情報を通過させるか、あるいは蓄積させるかのいずれかを示す項目と、から構成される中継管理テーブルを含むことを特徴とする請求項1記載の移動通信システム。

【請求項4】 前記移動ホストが前記ネットワークから切断される場合は、前記転送手段が、前記通信情報として切断可否通知を前記移動ホストへ転送することを特徴とする請求項1記載の移動通信システム。

【請求項5】 前記移動ホストが前記ネットワークから切断される場合は、前記転送手段が、前記通信情報として中継中断要求通知を前記通信情報中継装置へ転送することを特徴とする請求項1記載の移動通信システム。

【請求項6】 前記移動ホストが前記ネットワークから切断される場合は、前記中継転送手段が、前記通信情報として切断可否通知を前記移動ホストへ転送することを特徴とする請求項1記載の移動通信システム。

【請求項7】 移動ホストが、ネットワーク間をアドレスの変更を伴いながら移動する際に、移動ホスト宛の通



信情報を中継する通信情報中継装置において、  
前記移動ホストが通信不可の場合は、移動ホスト宛の通信情報を蓄積する中継蓄積手段と、  
前記移動ホストが通信可の場合は、前記移動ホストとの前記通信情報の中継転送を行う中継転送手段と、  
前記移動ホストの通信可否情報にもとづいて前記中継蓄積手段と前記中継転送手段との制御を行う中継制御手段と、  
を有することを特徴とする通信情報中継装置。

【請求項8】 移動ホストが、ネットワーク間をアドレスの変更を伴いながら移動する際に、移動ホストへ通信情報を転送する通信情報転送装置において、  
移動ホスト宛の前記通信情報を蓄積する蓄積手段と、  
前記移動ホストに前記通信情報を転送する転送手段と、  
移動ホスト宛の前記通信情報を中継する通信情報中継装置の存在情報と、前記移動ホストからの通信メッセージと、にもとづいて前記蓄積手段と前記転送手段との制御を行う通信制御手段と、  
を有することを特徴とする通信情報転送装置。

【請求項9】 移動ホストが、ネットワーク間をアドレスの変更を伴いながら移動して、移動の前後で継続的に通信を行うように制御する移動通信方法において、  
移動ホストが移動先アドレスを通信情報転送装置へ通知後にネットワークから切断する場合、移動先ネットワークに通信情報中継装置が存在する場合は、前記通信情報中継装置が移動ホスト宛の通信情報を蓄積し、  
前記通信情報中継装置が存在しない場合は、前記通信情報転送装置が前記通信情報を蓄積し、  
移動ホストが移動先ネットワークに接続する場合、移動先ネットワークに前記通信情報中継装置が存在するときは、前記通信情報中継装置が移動ホストに通信情報を転送し、  
移動先ネットワークに前記通信情報中継装置が存在しないときは、前記通信情報転送装置から移動ホストに前記通信情報を直接転送することを特徴とする移動通信方法。

【手続補正3】

【補正対象書類名】明細書

【補正対象項目名】0001

【補正方法】変更

【補正内容】

【0001】

【発明の属する技術分野】本発明は移動通信システム及び移動通信方法に関し、特にネットワーク間をアドレスの変更を伴いながら移動する移動ホストが、移動の前後で継続的に通信を行う移動通信システム及び移動ホストがネットワーク間をアドレスの変更を伴いながら移動して移動の前後で継続的に通信を行うように制御する移動通信方法に関する。

【手続補正4】

【補正対象書類名】明細書

【補正対象項目名】0014

【補正方法】変更

【補正内容】

【0014】本発明はこのような点に鑑みてなされたものであり、ネットワーク間の移動に伴うパケット通信の遅延時間を短く抑える移動通信システムを提供することを目的とする。また、本発明の他の目的は、ネットワーク間の移動に伴うパケット通信の遅延時間を短く抑える移動通信方法を提供することである。

【手続補正5】

【補正対象書類名】明細書

【補正対象項目名】0048

【補正方法】変更

【補正内容】

【0048】

【発明の効果】以上説明したように、本発明の移動通信システムは、通信情報転送装置と移動ホスト間に通信情報中継装置を配置して通信を行う構成とした。これにより、通信情報転送装置と移動ホスト間の通信距離が長くても、通信情報転送の遅延を減少することができ、移動ホストは新しいネットワーク上に接続した時の通信情報の受信時間を短縮することが可能になる。また、本発明の移動通信方法は、通信情報転送装置と移動ホスト間に通信情報中継装置を配置して通信を行うこととした。これにより、通信情報転送装置と移動ホスト間の通信距離が長くても、通信情報転送の遅延を減少することができ、移動ホストは新しいネットワーク上に接続した時の通信情報の受信時間を短縮することが可能になる。